Server HV8600

NEC

User's Guide

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User's Guide

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PN: 456-01505-000

First Issue — March 1999
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Equipment Log

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Using This Guide

This User's Guide provides a quick reference to information about your system. Its goal is to familiarize you with your system and the tasks necessary for system configuring and upgrading.

This guide contains the following information:

- Chapter 1, **"**System Overview" provides an overview of your system and describes your system's major system components. See this chapter to familiarize yourself with your system.
- Chapter 2, "Setting Up Your System" tells you how to select a site, unpack the system, make cable connections, and power on your system.
- Chapter 3, "Configuring Your System" tells you how to configure the system and provides instructions for running the BIOS Setup Utility and Symbios Configuration Utility. It also provides information on system board jumper settings and how to configure the RAID Controller.
- Chapter 4, "Upgrading Your System" provides you with instructions for upgrading your system with additional processors, optional memory, option cards, and peripheral devices.
- Chapter 5, "Problem Solving" contains helpful information for identifying and solving problems that might occur with your system.
- Appendix A, "System Cabling" includes cabling information for the onboard SCSI controller and the RAID controller board.
- Appendix B, "Memory Configurations" defines the allowable memory configurations for your system.
- "Glossary" defines the standard acronyms and technical terms used in this manual.
- "Equipment Log" provides you with a sample equipment log for documenting the system configuration and future updates you may make to your system.

Text Conventions

This guide uses the following text conventions.

Warnings, cautions, and notes have the following meanings:

WARNING

Warnings alert you to situations that could result in serious personal injury or loss of life.

CAUTION

Cautions indicate situations that can damage the system hardware or software.

Note: Notes give important information about the material being described.

- Names of keyboard keys are printed as they appear on the keyboard. For example, **Ctrl**, **Alt**, or **Enter**.
- Text or keystrokes that you enter appear as boldface type. For example, type **abc123** and press **ENTER**.
- File names are printed in uppercase letters. For example, AUTOEXEC.BAT.

Related Documents

In addition to this guide, the following system documentation is included with your server either as electronic files on EXPRESSBUILDER or as paper copy shipped with your server.

- *System Release Notes*
  Release Notes provide you with the latest information about your system. This information was not available at the time your user's guide was developed.
- *Getting Started Sheet*
  The Getting Started Sheet provides several easy-to-follow steps to become familiar with your server documentation and to complete your installation successfully.
- *Network Operating System Configuration Guide*
  This guide contains supplemental instructions needed to install and configure your server Windows NT v4.0 Network Operating System. This document is intended to complement the more detailed procedural documents available from the vendor of the network operating system.

Safety Notices

- **Caution:** To reduce the risk of electric shock which could cause personal injury, follow all safety notices. The symbols shown are used in your documentation and on your equipment to indicate safety hazards.
- **Warning:** Lithium batteries can be dangerous. Improper handling of lithium batteries may result in an explosion. Dispose of lithium batteries as required by local ordinance or as normal waste if no local ordinance exists.
- **Warning:** The detachable power supply cord is intended to serve as the disconnect device.
- **Warning:** This equipment has four 3-wire, grounded power cords. To prevent electrical hazards, do not remove or defeat the ground prong on the power cord. Replace the power cord if it gets damaged. Contact your dealer for an exact replacement.
- **Warning:** The DC push-button on/off switch on the front panel does not turn off the system AC power. Also, +5vdc is present on the system board whenever the AC power cord is connected between the system and an AC outlet. Before doing the procedures in this manual, make sure that your system is powered off and unplug the AC power cord from the back of the chassis. Failure to disconnect power before opening your system can result in personal injury and equipment damage.

In the U.S.A. and Canada, each power cord must be a UL-listed detachable power cord (in Canada, CSA-certified), type ST or SJT, 16 AWG, 3-conductor, provided with a molded-on NEMA type 5-15 P plug cap at one end and a molded-on cord connector body at the other end. The cord length must not exceed 9 feet (2.7 meters).

Outside the U.S.A. and Canada, the plug must be rated for 250 Vac, 10 amp minimum, and must display an international agency approval marking. The cord must be suitable for use in the end-user country. Consult your dealer or the local electrical authorities if you are unsure of the type of power cord to use in your country. The voltage change occurs via a switch in the power supply.

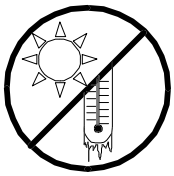
- **Warning:** Under no circumstances should the user attempt to disassemble the power supply. The power supply has no user-replaceable parts. Inside the power supply are hazardous voltages that can cause serious personal injury. A defective power supply must be returned to your dealer.

Safety Notices for Users Outside of the U.S.A. and Canada

- **PELV (Protected Extra-Low Voltage) Integrity:** To ensure the extra-low voltage integrity of the equipment, connect only equipment with mains-protected electrically-compatible circuits to the external ports.
- **Remote Earths:** To prevent electrical shock, connect all local (individual office) computers and computer support equipment to the same electrical circuit of the building wiring. If you are unsure, check the building wiring to avoid remote earth conditions.
- **Earth Bonding:** For safe operation, only connect the equipment to a building supply that is in accordance with current wiring regulations in your country. In the U.K., those regulations are the IEE.

Care and Handling

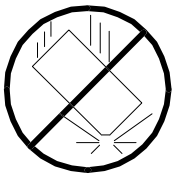
Use the following guidelines to properly handle and care for your system.



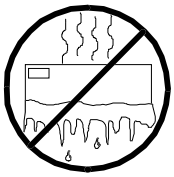
Protect the system from extremely low or high temperatures. Let the system warm (or cool) to room temperature before using it.

Keep the system away from magnetic forces.

Keep the system dry. Do not wash the system with a wet cloth or pour fluid into it.



Protect the system from being bumped or dropped.



Check the system for condensation. If condensation exists, allow it to evaporate before powering on the system.

Keep the system away from dust, sand, and dirt.

1

System Overview

- Overview
- Chassis
- System Board Features
- Peripheral Devices
- System Power
- Software Locks via the BIOS Setup
- Disk Array
- Hot Swapping
- Hot Plug PCI
- Degradation
- AC Linkage Mode
- Sleep Mode
- System Functions

Overview

The server is a modular, multiprocessing server based on the Intel® Pentium® III Xeon™ processor chip set. The chip set incorporates a modular scaleable architecture that integrates a 64-bit bus interface with three Peripheral Component Interconnect (PCI) buses and an Industry Standard Architecture (ISA) bus. The architecture supports Symmetrical Multiprocessing (SMP) and a variety of operating systems. The chassis and system boards are designed to meet the needs of the server marketplace.

The combination of computing performance, memory capacity, and integrated I/O provides a high performance environment for many applications including network servers and multi-user systems. The server is designed for use in applications where downtime must be minimized. To this end, the server includes or has the option to include the following.

- All systems are configured with an additional redundant power supply. The redundant power supply system will continue to operate in the event of a single power supply failure.
- Hot-swap self-contained power supply units that can be easily installed or removed from the back of the chassis.
- Hot-swap Ultra2-wide SCSI hard drive bays accessible from the front of the chassis where a failed drive can be removed, and a new drive installed without system power being turned off.
- High degree of SCSI hard disk fault tolerance and advanced disk array management features through the use of RAID (Redundant Array of Independent Disks) technology.
- Cooling system redundancy where the system will continue to operate in the event of a fan failure or having cabinet temperatures approaching the threshold limit, the redundant fans will switch to maximum operating speed.
- Hardware monitors (temperature and voltage) and software monitors to indicate failures.
- Easy access to all parts for service.

System Feature Summary

A summary of the system features is included in Table 1-1.

Table 1-1. System Features

Feature	Description
Modular board set	System is intended for use with a modular board set based on Pentium III Xeon processor technology; from one to eight 500 MHz processors and up to 8 GB of memory.
Add-in board support	System I/O board supports up to 8 add-in boards (seven PCI boards, including four slots supporting 64-bit PCI boards, and one ISA board slot. The Hot Plug PCI* board plugs into the System I/O board, supporting up to four Hot Plug 32-bit PCI board slots.
3 1/2-inch diskette drive	3 1/2-inch diskette drive is externally accessible.
One location for a 3 1/2-inch removable media device	One externally accessible 3 1/2-inch half-height bay is available for server expansion.
5 1/4-inch SCSI CD-ROM	5 1/4-inch CD-ROM drive is externally accessible.
Three locations for 5 1/4-inch removable media devices	Three externally accessible 5 1/4-inch half-height bays are available for server expansion (diskette, CD-ROM, and/or tape drives).
12 locations for 3 1/2-inch Ultra2-wide SCSI-2 hard drives	Three hard disk drive cages; each holding up to four 3 1/2-inch hot-swappable Ultra2-wide SCSI-2 hard drives. Each cage is secured behind a metal EMI door; drives can be swapped in or out of the system without powering it down. The array of drives allows easy setup of RAID applications.
Hot swap-capable backplane	A hot swap-capable backplane is part of each drive cage assembly for SCSI hard drives. The backplane is designed for Ultra2-wide SCSI-2 devices that use the industry standard 80-pin Single Connector Attach (SCA) connector. The backplane consists of a row of four drive connectors.
Power supply	Four 560-Watt autoranging power supplies are easily removed/installed for service. The fourth supply is redundant.
Software: utilities, setup	BIOS Setup and Symbios Configuration Utility. The EXPRESSBUILDER CD-ROM contains the setup utilities and drivers. The ESMPRO CD-ROM contains the server management software.
Security	Mechanical: Key lock at the front door. One intrusion sensor for front door to secure diskette, hard disk, removable media device, power on/off switch, reset switch, top cover, and left/right panel access. Three power inter-lock sensors one on each side of the chassis and one on top of the chassis. BIOS: Password enable.

*The Hot Plug PCI feature is currently not useable on the system, until Operating System support is available.

Expanding the Server as Needs Grow

A typical minimum system configuration may include the following:

- Board set consisting of system I/O board, CPU baseboard with one 500 MHz Pentium® III Xeon™ processor, and one memory board containing 256 MB of memory
- Diskette drive and SCSI CD-ROM drive
- Three SCSI hard drive cages with one hard drive and a RAID controller installed
- Integrated LAN controller
- Four 560 watt power supplies (the fourth power supply provides redundant power)
- Onboard 2 MB video memory
- System I/O board has one ISA slot and seven PCI slots for add-in boards. The Hot Plug PCI board also plugs into the system I/O board, supporting up to four Hot Plug PCI board slots. The system I/O board has a riser board for external I/O (serial, parallel, video, SCSI, USB, LAN, keyboard, and mouse) interfaces.
- Chassis can hold six removable media drives: four 5 1/4-inch half-height bays with a CD-ROM drive installed in one bay; and two 3 1/2-inch half-height bays with a diskette drive installed.

As server/client needs grow, you can expand system processor capacity, memory, drives, option boards, and the number of power supplies.

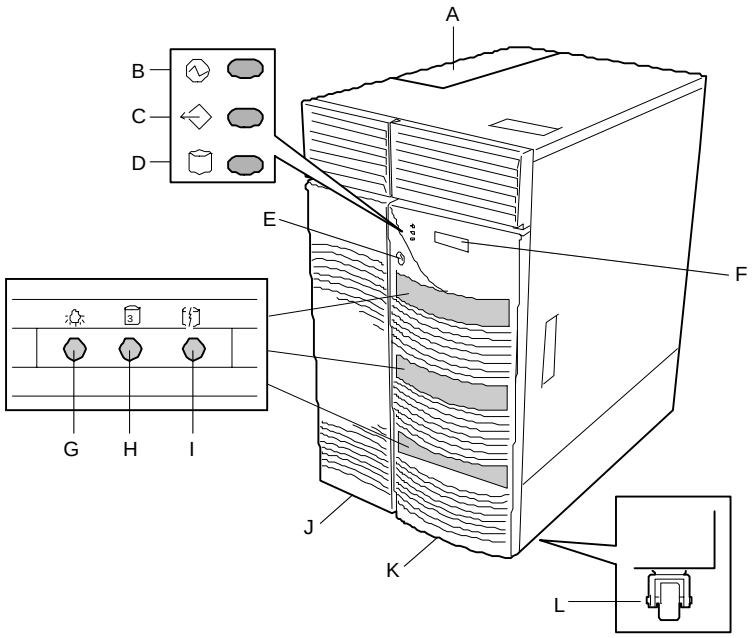
- CPU backboard has four slots for CPUs, for a configurable range of one, two, three, or four processors.
- Two memory boards support 32 DIMM devices, that is16 DIMM devices per board, for up to a maximum memory size of 8 GB of memory.
- System I/O board has twelve option board slots (eleven PCI and one ISA slot).
- Chassis can hold six removable media drives.
- Three SCSI hard drive cages support up to 12 hot-swap bays for 3 1/2-inch Ultra2-wide SCSI-2 hard drives.

Configuration Constraints

The system has four 5 1/4-inch half-height bays accessible from the front. These bays are convenient for diskette, tape, and CD-ROM drives (removable media). Because of the EMI generated by hard drives, the increased susceptibility to ESD, and cooling requirements, hard drives should not be installed in the 5 1/4-inch half-height bays.

Chassis

Figure 1-1 shows the server front chassis features and controls.



A	Hot Plug PCI slots	Four 32 bit hot-swappable PCI slots.
B	Power LED	When green, power is present in system. When off, power is turned off, power source is disrupted, or system is in the sleep mode. See Table 1-2 for a list and description of the system LEDs.
C	Status LED	When green the system is OK. See Table 1-2 for a list and description of the system LEDs.
D	Disk LED	When green, internal disk drives are being accessed. See Table 1-2 for a list and description of the system LEDs.
E	Key lock	Secures both front external doors.
F	LCD panel	Displays information about BIOS and system failures (error and diagnostic information).
G **H** **I**	Drive present Drive activity Drive status	Each drive has three LEDs visible above the bay from the front. See Table 1-3 for a list of SCSI disk drive status LED indicators.
J	Left front door	Used when accessing a 5 1/4-inch device.
K	Right front door	Used to access the power switch, sleep switch, floppy disk drive, or a hard disk drive in a 3 1/2-inch device bay.
L	Casters (4)	Used when moving the server. Fixed by the caster holders.

Figure 1-1. Front Chassis Features and Controls

Status LED Indicator Descriptions

Table 1-2 lists the system status LED indicators along with a description of each LED indicator. Table 1-3 lists the disk drive status LED panel indicators along with a description of each LED indicator. Table 1-4 lists system status abnormal conditions.

Table 1-2. System Status LED Indicators

LED	Status	Description	Response
Power	Off	Power OFF	None required (normal)
	Green	Power ON	None required (normal)
	Amber	System power supply failure or in sleep mode	Replace failed power supply module or check to see if the system is in sleep mode.
Status	Off	Power OFF	None required (normal)
	Green	No alarms	None required (normal)
	Amber	Abnormal condition (see Table 1-4)	Check condition
Disk	Off	Not accessing disk drives	None required (normal)
	Amber	Internal disk drive failure	Check disk drive status LEDs
	Green	Accessing disk drives	None required (normal)

Table 1-3. Disk Drive Status LED Panel Indicators

LED	Status	Description	Response
Disk Drive Present	Off	Disk drive not present	None required (normal)
	Green	Disk drive present	None required (normal)
Disk Drive Activity	Off	Not accessing disk drive	None required (normal)
	Green	Accessing disk drive	None required (normal)
Disk Drive Status	Off	No alarms	None required (normal)
	Amber (Steady light)	Disk drive failure	Replace disk drive
	(Flashing light)	Rebuilding data (in disk array configuration only)	None required (normal)

Table 1-4. System Status Abnormal Conditions

LED (Amber)	Conditions
System Status	Chassis intrusion (front cover) Unit fan alarm Memory multi-bit error (SERR) P6 bus error (SERR) Thermal sensor Temperature Voltage CPU thermal trip PCI PERR# (OPB/ESC detect) PCI SERR# CPU internal error WDT IOCHK

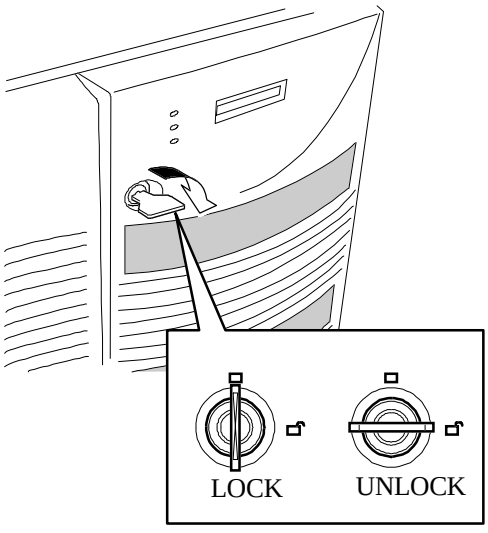
Opening the Front Doors

You must open the right front door to turn the server power on or off, place the server in sleep mode, mount or dismount a floppy disk, or mount or dismount a hard disk drive. Open the left front door to mount or dismount 5 1/4-inch removable media devices.

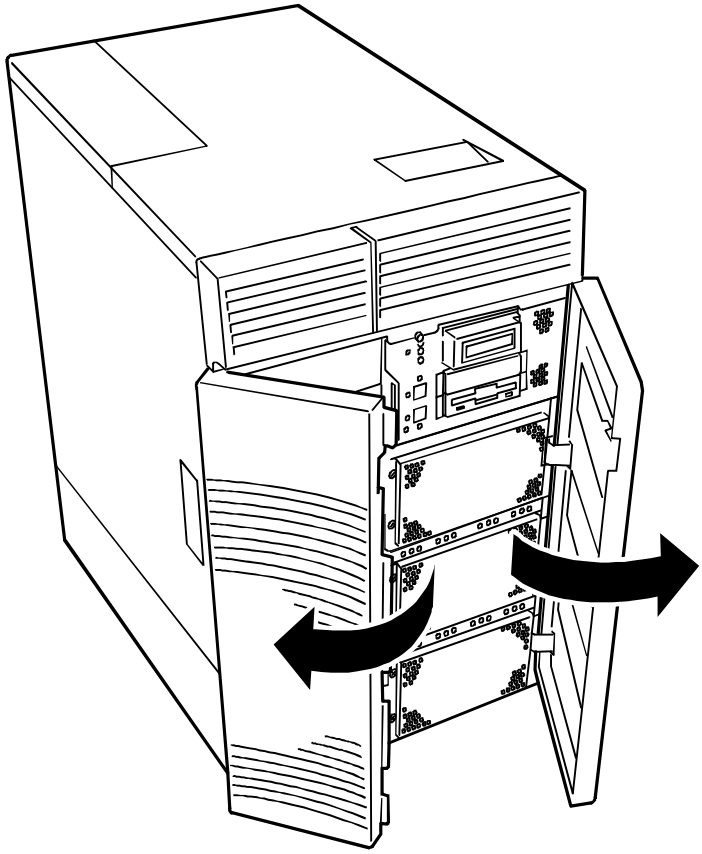
> ***Note:*** Some options for the 5 1/4-inch devices such as a CD-ROM drive have a function to eject a tray or media using a software command. Before issuing a software command to eject a tray or media, confirm that the front door is open. If the command is executed while the front door is closed a tray or media may run into the front door resulting in an error or may cause the unit to fail.

Open the front doors as follows.

1. To open the front doors, you need to use the security key provided with the server. Insert the security key into the key slot and turn the key to the right (see the following figure).

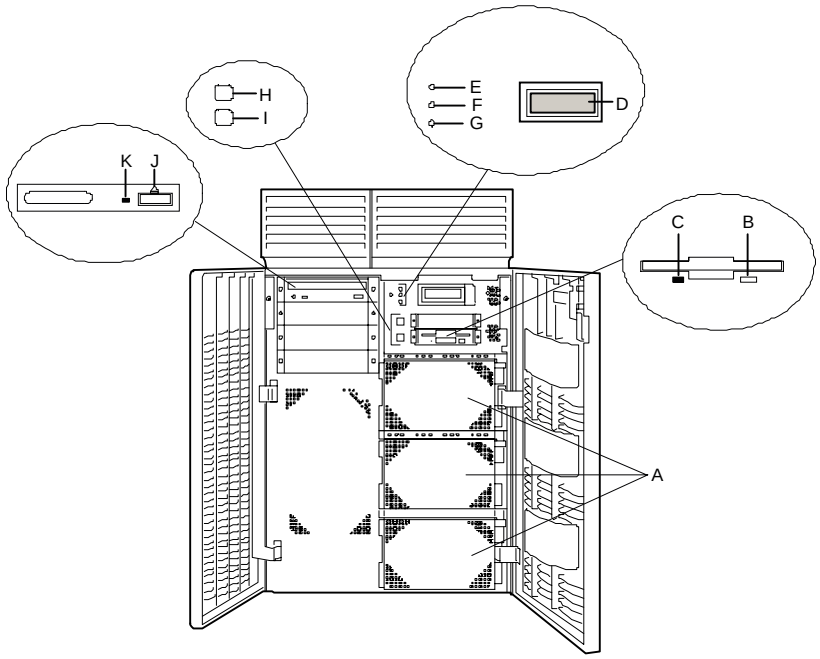


2. First open the right front door, then open the left door (see the following figure).



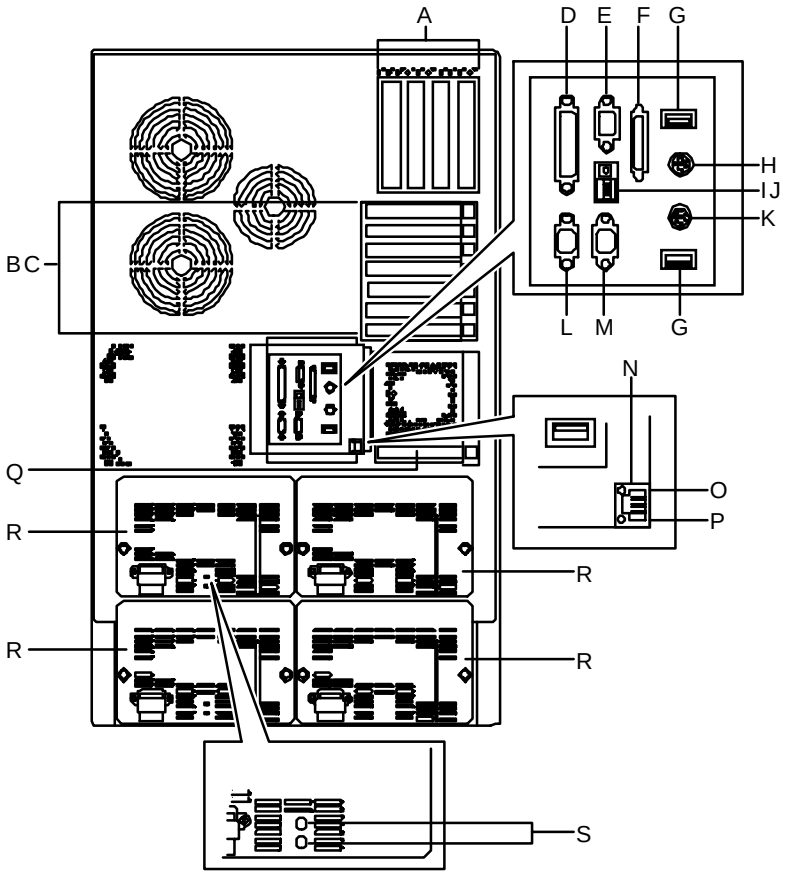
Chassis Features and Controls

Figure 1-2 shows the server front chassis features and controls. Figure 1-3 shows the server rear chassis features and controls.



A	SCSI hard drive cages (3)	Each cage contains four disk drives. Above each drive are three status LEDs. Refer to Table 1-3 for information on disk drive status LEDs.
B	Ejector button, 3 1/2-inch diskette drive	Press to eject diskette.
C	Activity light, 3 1/2-inch diskette drive	When lit, drive is in use.
D	LCD panel	Displays information about BIOS and system failures (error and diagnostic information).
E	Power LED	When green, power is present in system. When off, power is turned off or power source is disrupted. See Table 1-2 for a list and description of the system LED indicators.
F	Status LED	When green the system is OK. See Table 1-2 for a list and description of the system LED indicators.
G	Disk LED	When green, internal disk drives are being accessed. See Table 1-2 for a list and description of the system LED indicators.
H	DC power switch	Press to turn system DC power on or off.
I	Sleep switch	Press to enter power saving (sleep) mode. Press again to enter normal mode of operation. This function requires a corresponding operating system.
J	Load/eject button, CD-ROM drive. (Note that the front controls may vary per model of CD-ROM drive.)	Press to load CD and eject CD.
K	Activity light, CD-ROM drive. (Note that the status indicators may vary per model of CD-ROM drive.)	When lit, drive is in use.

Figure 1-2. Front Chassis Features and Controls (front doors opened)



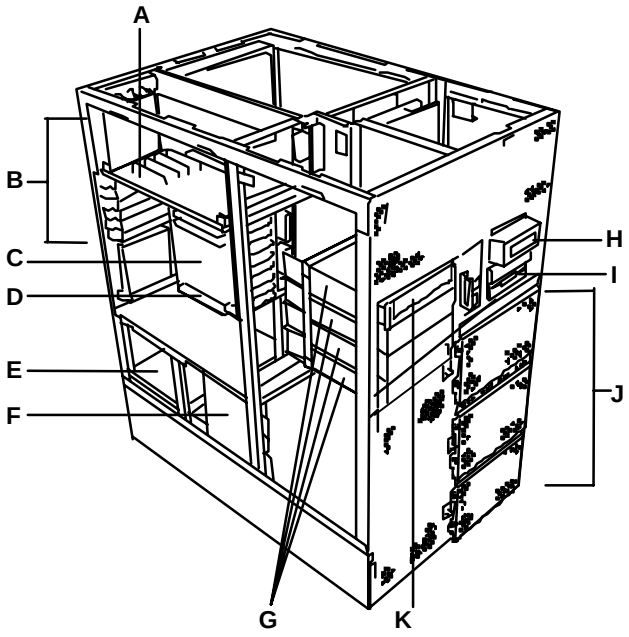
A	Hot Plug PCI slots	Four Hot Plug PCI add-in board slot locations (PCI #21, PCI #22, PCI #23, and PCI #24). Hot Plug PCI slot functionality depends on the type of operating system support. Please note that without PCI Hot Plug operating system support you cannot replace PCI boards while the server is powered on.
B	PCI slots	Three PCI add-in board slot locations (PCI #11, PCI #12, and PCI #13).
C	PCI slots	Four 64-bit add-in board slot locations (PCI #31, PCI #32, PCI #33, and PCI #34).
D	Printer	LPT1 25-pin parallel port connector.
E	Monitor	VGA monitor 15-pin connector.
F	External-SCSI	Narrow-SCSI 50-pin connector.
G	USB	USB Interface connector. Appropriate driver is required.
H	Keyboard	PS/2-compatible 6-pin mini-DIN connector.
I	Function select switches	See *Configuring Switch and Jumper Settings* in Chapter 4 of this User's Guide.
J	Reset button	Press to reset system or execute a memory dump. The reset function and dump function can be switched by setting the function select switches.
K	Mouse	PS/2-compatible 6-pin mini-DIN connector.
L	COM1	COM1 serial port 9-pin connector.
M	COM2	COM2 serial port 9-pin connector.

N	LAN	100Base-TX network LAN connector.
O	Status LED	Lit when system is connected to a LAN Network with a 10Base-T cable. When connected with a 100Base-TX cable, it does not light.
P	Active LED	Lit when information packets are exchanged between the system and the network.
Q	ISA slot	One ISA add-in board slot location.
R	Power supplies	Four power supplies (one redundant). Each power supply has a separate AC input power connector.
S	Power status LEDs	Both indicators are green during normal operation. Either or both indicators go off when power supply fails. See Table 1-2 for status descriptions.

Figure 1-3. Rear Chassis Features and Controls

System Board Features

The board set includes the Hot Plug PCI board, system I/O board, base board, CPU backboard, and a memory board. The system I/O board is mounted vertically on the left side of the system. Figure 1-4 shows the system with the left side cover removed.



A Hot Plug PCI board

B Expansion slot covers

C System I/O board

D Additional ISA slot

E Power unit

F Power backplane

G Four 5 1/4-inch half-height bays with a CD-ROM drive installed in bottom bay

H Liquid crystal display (LCD)

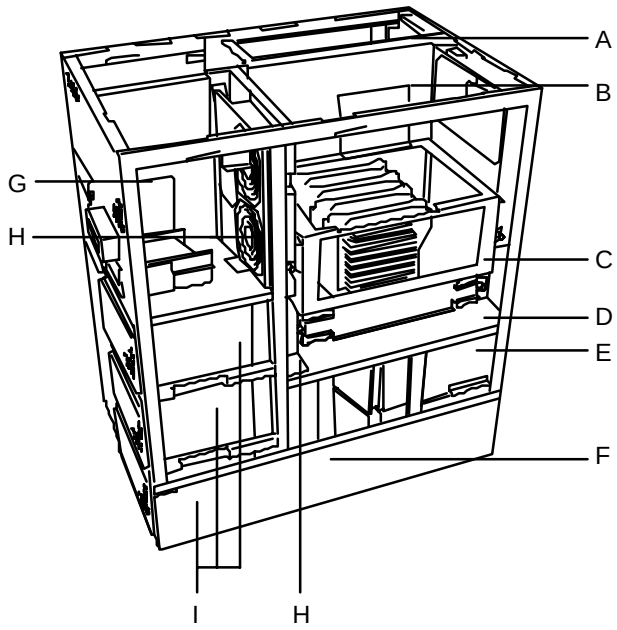
I Diskette drive

J Hard disk drive bays

K CD-ROM drive (standard)

Figure 1-4. System I/O Board Location

The Hot Plug PCI board plugs into the left side of the system I/O. The base board plugs into the right side of the system I/O board and the CPU backboards and memory boards plug into the base board. Figure 1-5 shows the system with the right side cover removed.



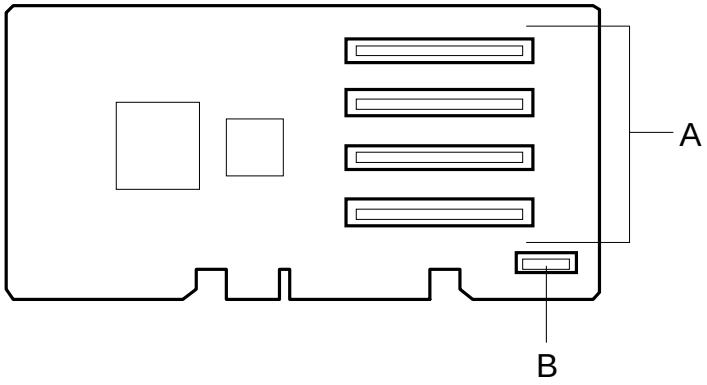
A	Base board
B	Terminator board
C	CPU backboard (supports 1 - 4 Pentium III Xeon processors with associated VRMs)
D	Memory board
E	Power unit
F	Power back panel #1
G	Front panel board
H	Cooling fans (upper 2 for the CPU, lower two for the memory boards)
I	Hard disk drive bays

Figure 1-5. Base Board, Terminator Board, CPU Backboard, and Memory Board Location

Figures 1-6, 1-7, 1-8, 1-9, and 1-10 show the major components on the Hot Plug PCI board, system I/O board, base board, CPU backboard, and memory board. Table 1-5 summarizes the features of the board set.

Table 1-5. Features of the Board Set

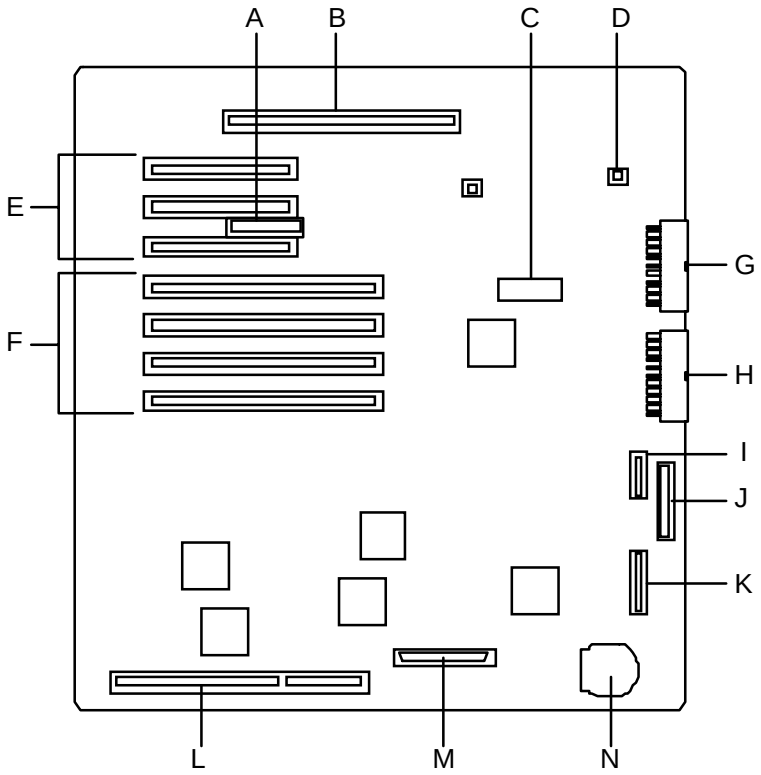
Feature	Description
Hot Plug PCI slots	Four Hot Plug PCI add-in board slot locations.
Multiple processor slots	Four processor sockets on each of the two CPU backboards.
Upgradable memory	Sixteen DIMM sockets on each of the two memory boards, supporting up to 8 GB memory using 256 MB DIMMs.
Add-in board support	One ISA bus slot, four dedicated 64-bit PCI bus slots and seven 32-bit PCI bus slots on the system I/O board and Hot Plug PCI board.
SCSI controller	Single onboard SCSI-2 controller (PCI-based).
BIOS	Flash memory-based BIOS (Basic Input/Output System) and Setup utilities.
Video	Integrated super VGA controller ships with 2 MB of video memory.
External device connectors	Onboard connectors for two serial ports, parallel printer port, narrow SCSI port, two USB connectors, 100Base-TX connector, PS/2-compatible keyboard and mouse, and VGA monitor.
Clock	Real-time clock/calendar (RTC).
System hardware monitoring	Detects chassis intrusion and contains sensors for temperature, voltage, and fan failure.
Configuration utilities	BIOS Setup and Symbios Configuration Utility.



A Second PCI board slot (PCI #21, PCI #22, PCI #23, and PCI #24)

B LED switch board connector

Figure 1-6. Hot Plug PCI Board Connector and Component Locations



A Server management board connector

B Hot Plug PCI board connector

C Non-volatile Memory (NVRAM) with built-in lithium battery

D Fan connector

E First PCI board slots (32-bit) (PCI #11, PCI #12 and PCI#13 from the bottom).

F Third PCI slots (64-bit) (PCI #31, PCI #32, PCI #33 and PCI #34 from the bottom). The first disk array controller must be mounted in PCI #32 then subsequent disk array controllers are mounted in sequence (PCI #33, PCI #34, etc.)

G Power connector 2

H Power connector 1

I Front panel connector

J Floppy disk drive connector

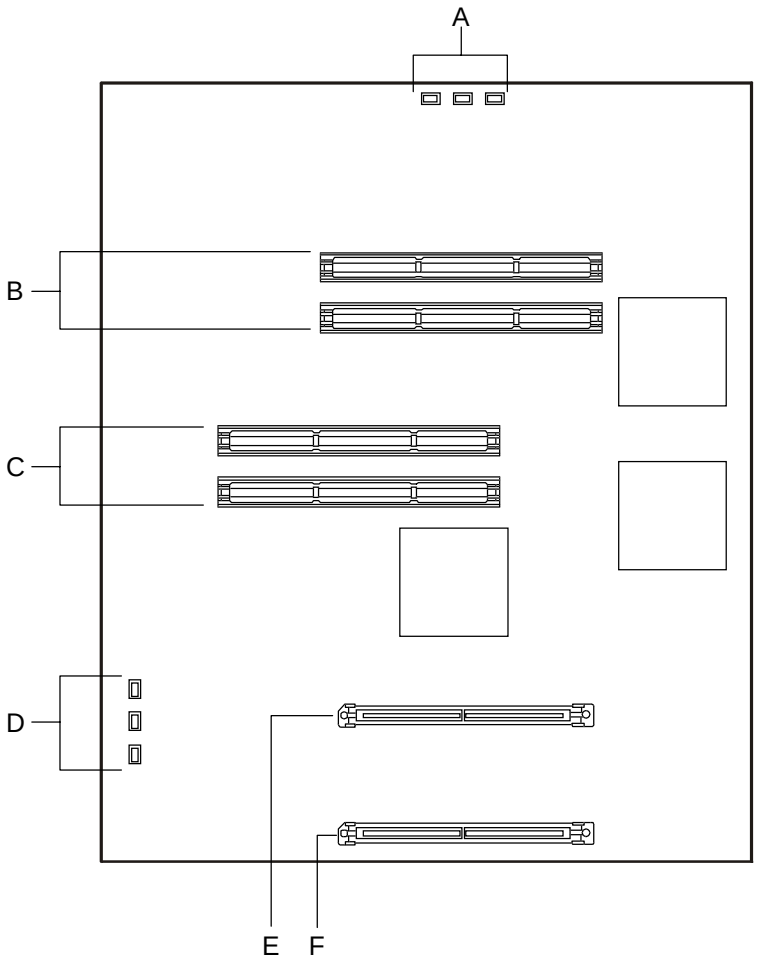
K Power backplane connector

L ISA board slot

M First SCSI-2 connector

N Battery (lithium)

Figure 1-7. System I/O Board Connector and Component Locations



A Fan connectors (fan connector #4, #5, and #6 from the left).

B CPU backboard connector (Optional). When an optional CPU backboard is not mounted, a terminator must be connected.)

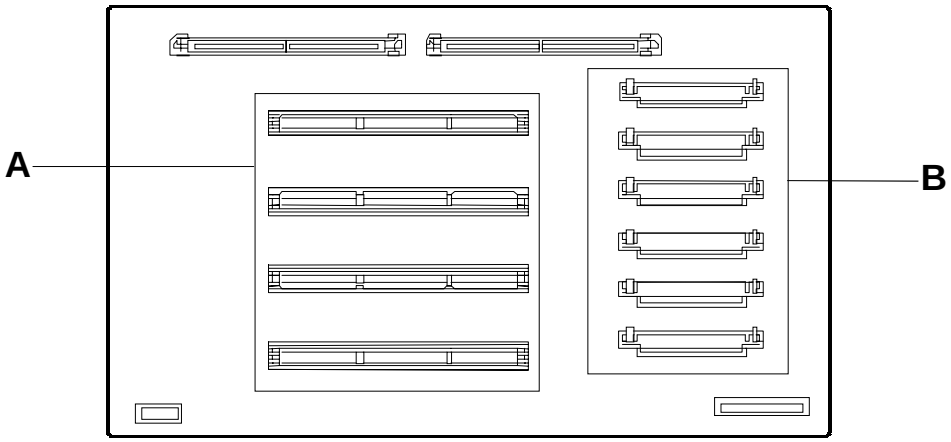
C CPU backboard connector (Standard).

D Fan connectors (fan connector #3, #2, and #1 from the top).

E Memory board connector #2

F Memory board connector #1

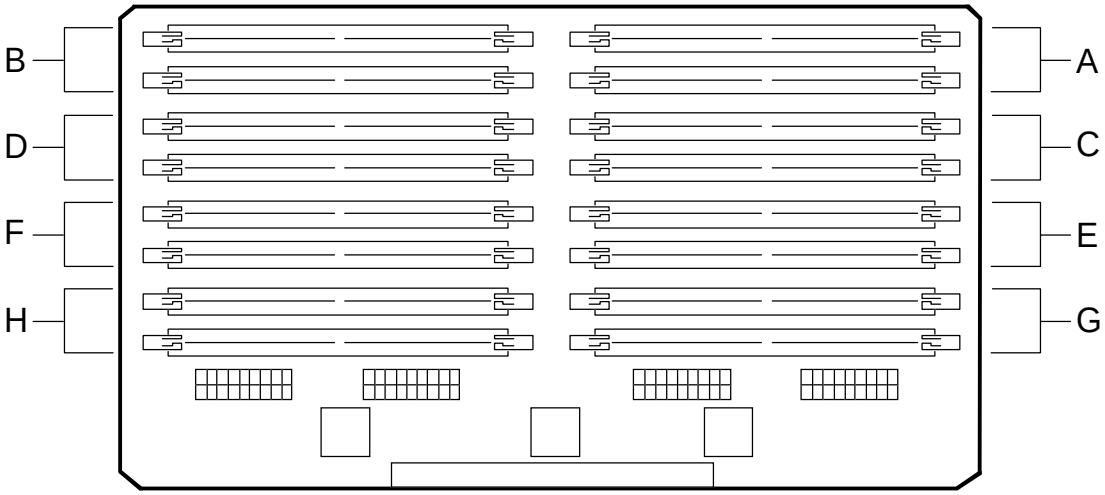
Figure 1-8. Base Board Component Locations



A Pentium III Xeon processor sockets (1 - 4 from bottom)

B VRM sockets (1 - 6 from bottom)

Figure 1-9. CPU Backboard Component Locations



A DIMM sockets (Bank #A, Slot 1 and Slot 3)

B DIMM sockets (Bank #A, Slot 2 and Slot 4)

C DIMM sockets (Bank #B, Slot 5 and Slot 7)

D DIMM sockets (Bank #B, Slot 6 and Slot 8)

E DIMM sockets (Bank #C, Slot 9 and Slot 11)

F DIMM sockets (Bank #C, Slot 10 and Slot 12)

G DIMM sockets (Bank #D, Slot 13 and Slot 15)

H DIMM sockets (Bank #D, Slot 14 and Slot 16)

Figure 1-10. Memory Board Component Locations

Processor

Each Pentium III Xeon processor is packaged in a single edge contact (S.E.C.) cartridge. The cartridge includes the processor core with an integrated 16 KB primary (L1) cache; the secondary (L2) cache (1MB or 2MB); a thermal plate; and a back cover. The cartridge is secured by a retention module attached to the CPU backboard. Depending on configuration, your system has one to eight processors (see Figure 1-9). Additional processors enhance performance and enable symmetric multiprocessing (SMP). All processors access the same memory and I/O space and tasks can run on either CPU if your operating system (OS) supports SMP.

Memory

The system supports a maximum of two memory boards. Each memory board contains sixteen 168-pin DIMM sockets (see Figure 1-10). A minimum system configuration includes 256 MB (using four 64 MB DIMMs) of system memory. Sixteen DIMM sockets on each memory board allow for system memory expansion up to 8 GB (using a total of thirty two 256 MB DIMMs on two memory boards.) ECC generation/checking is provided for detection and correction of memory errors.

> ***Note:*** Only use DIMMs approved for use in this server system. Call your customer service representative for information.

Bus Master I/O Expansion Slots

The server's expansion capabilities meet the needs of high performance I/O servers by providing a combination of PCI local bus and ISA connectors. The system I/O board offers eleven dedicated PCI slots, four of which are 64-bit, and one ISA slot. The ISA architecture supports 32-bit memory addressing and 16-bit data transfers for the CPU, DMA, and bus masters.

Real-Time Clock/Calendar

The real-time clock provides system clock/calendar information stored in a non-volatile memory (NVRAM) (Figure 1-6, M). The real-time clock battery (see Figure 1-6, G) provides power backup for the real-time clock.

BIOS

A BIOS and Setup Utility are located in the Flash memory on the system I/O board and include support for system setup and PCI/ISA Plug-and-Play auto-configuration. A number of security, reliability, and management features are also incorporated to meet vital server needs.

Video

The onboard super VGA controller (PCI) is a high-performance SVGA subsystem that supports:

- BIOS compatibility with VGA, EGA, CGA, Hercules Graphics, and MDA
- 2 MB of Video Memory
- 16-bit bus for high-speed display memory access
- Hardware accelerated bit block transfers (BITBLT)
- 72Hz refresh, non-interlaced at: 640x480, 800x600, or 1280x1024 resolutions
- Up to 16M colors at 640x480 and 800x600 resolutions, 64K colors at 1024x768 resolutions and 256 colors at 1280x1024 resolutions with the optional 2 MB video memory.

> ***Note:*** SVGA drivers may be required to use the high-performance video modes.

SCSI Controller

The system I/O board includes a single Ultra2-wide SCSI-2 controller (LSI Logic SYM53C875) integrated as a PCI bus master. This controller supports data paths of 8-bit (fast/narrow SCSI) at a data transfer rate of 10 MB/sec and 16-bit (fast/wide or ultra /wide SCSI) at a data transfer rate of 20 MB/sec or 40 MB/sec. As a PCI bus master, this controller supports burst data transfer rates up to the maximum of 133 MB/sec.

Peripheral Controller

The advanced integrated peripheral controller supports two serial ports and one parallel port through the I/O riser board (see Figure 1-6, A). The advanced integrated peripheral controller also supports the connection of two diskette drives (see Figure 1-6, I).

External Device Connectors

The I/O panel provides connectors for a PS/2 compatible mouse and a keyboard, connectors for VGA monitor, two serial port connectors, parallel printer port connector, and a USB interface connector. It also provides a narrow SCSI external connector.

Keyboard and Mouse

The keyboard/mouse controller is PS/2-compatible.

Fans

In addition to the power supply fans, the system has an option board fan cabled to the I/O board, six CPU fans cabled to the base board, and two memory board fans cabled to the power backpanel #1. The three CPU fans (front and rear) are redundant in configuration. If one fan fails, its associated fan changes its rotating speed to high.

Peripheral Devices

The following paragraphs describe the Ultra2-wide SCSI-2 hard drive bays and 5 1/4-inch removable media drive bays.

Ultra2-Wide SCSI-2 Hard Drive Bays

The right side of the system contains up to three Ultra2-wide SCSI hard drive cages for 3 1/2-inch SCSI-2 hard drives (see Figure 1-9). Each hard drive cage has a hot-swap backplane that supports four drives. The backplanes require an 80-pin single connector attachment (SCA) connector on the drives you install.

A drive carrier is required as part of the hot swap implementation. A 3 1/2-inch peripheral between 1.0 and 1.6 inches high can be accommodated in each carrier. A drive is mounted in the carrier with four screws, and the carrier is retained in the chassis by a locking handle.

A fault light on the front panel board gives a general indication that there has been a fault on a hot-swap drive as detected by the RAID controller. Each drive has a set of three lights to indicate the fault or other status: power-on (green LED), activity (green LED), or fault (yellow LED).

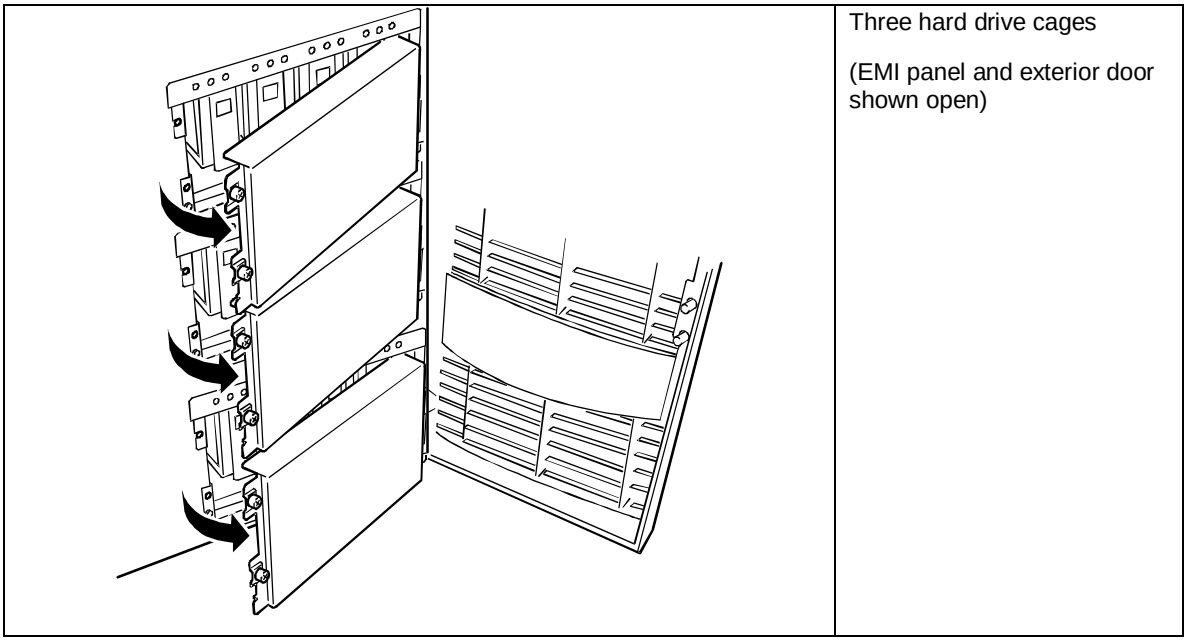


Figure 1-9. Ultra2-Wide SCSI-2 Hard Drive Bays

The backplane has two main functions: SCSI drive control and system data logging. Drive status is monitored to detect failing drives and to control LED indicators. The backplane features include the following:

- Insertion and removal of hard drives while power is on (referred to as "hot swap")
- Simplified cable management
- SCA connectors to simplify inserting and removing hard drives
- SCSI management of fault LEDs.

Each backplane supports SCSI drives with SCA connectors.

Removable Media Drive Bays

On the upper left side of the system, four 5 1/4-inch half-height bays (see Figure 1-10) are designed for peripherals with removable media (diskette, CD-ROM, tape). Two available adjacent 5 1/4-inch bays can be converted to a single full-height bay. The 5 1/4-inch drives can be removed directly from the front of the chassis. Removal of the system top cover may be required to install/remove the device cables. Cosmetic filler panel is installed over all unused 5 1/4-inch bays.

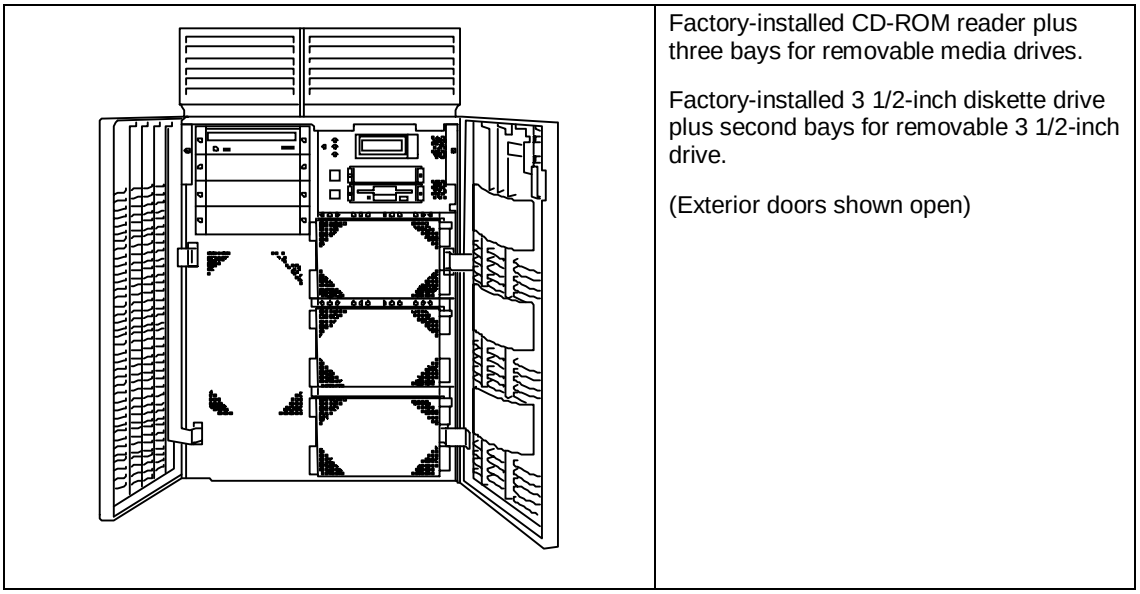

Factory-installed CD-ROM reader plus three bays for removable media drives.
Factory-installed 3 1/2-inch diskette drive plus second bays for removable 3 1/2-inch drive.
(Exterior doors shown open)

Figure 1-10. Removable Media Drive Bays

On the upper right side of the system, below the LCD panel, are two built-in 3 1/2-inch bays. One contains a 3 1/2-inch diskette drive that supports both 720 KB and 1.44 MB media (see Figure 1-10).

> ***Note:*** The SCSI termination resistors must be installed in the last SCSI drive of the daisy chain cabling (bottom media bay). All other devices must have terminators removed.

System Power

The system may be configured with up to four 560-Watt power supplies. Each supply automatically switches between these input voltage ranges:

- 100-125 VAC at 50/60 Hz; 10.5 A maximum current
- 200-240 VAC at 50/60 Hz; 5.5 A maximum current

Each power supply provides DC outputs of +5 V, +12 V, +3.3 V, -5 V, and -12 V. All output grounds connect to the power supply chassis and to earth ground through the AC line cord. Each supply has:

- Individual AC input line cord that plugs into the external side of the power supply
- Isolating device on each DC output so that the failure of one supply does not affect the operation of the others
- Cooling fan integral with each power supply enclosure. The fan circuit implements fan failure detection.

In a system, power is drawn equally from all supplies installed. A system with three power supplies can be fully loaded (all drive bays and add-in board slots filled). The supplies use a forced current-sharing technique that ensures the supplies share within 10 percent at full load. In a high-access system with four power supplies, the fourth supply gives redundancy, because the load is redistributed if one supply fails.

Software Locks via the BIOS Setup

The BIOS Setup has software features that let you control access to one or more parts of the system:

- Set and enable an administrative password
- Set and enable a user password
- Enable password on boot
- Disable writing to the diskette drive when secure mode is set.

If only a supervisor password is set and enabled, enter this password to boot the server.

If both the user and administrative passwords are set and enabled, enter either one to boot the server. Enter the administrative password to access the BIOS Setup to change the system configuration.

Disk Array

The hard disk drive bays of the server support disk array configuration RAID levels 0, 1, 5 and 6.

RAID is an acronym of “Redundant Arrays of Inexpensive (Independent) Disks”. It logically integrates several hard disks to appear to the system as only one disk drive.

Using the disk array method, the large-capacity hard disk can be configured with several inexpensive and small-capacity hard disks. It can also enhance the drive by improving the reliability and supporting an automatic rebuilding function.

All RAID levels are common in their basic operation due the fact that several hard disks can be recognized as one disk drive. However, performance, cost, and use are conditions that vary according to the RAID level. You should select an appropriate configuration that is suitable for your system.

Features and selection examples of different RAID levels are shown below.

Level	Definition	Redund-ancy	Feature	Suitable application	Minimum No. of disks
RAID0	Striping	No	Access: high-speed. Improves reliability.	Application that needs high performance for non-critical data	2
RAID1	Mirroring (or shadowing)	Yes	Dual disk system. Read mode: high-speed Write mode: slow speed	Application that needs to store important files on main system drive	2
RAID5	Striped data and parity	Yes	Parity data. Transfers large amount of data. Access: slow	Application that needs high speed transfer rate. Application of read-intensive type data searching.	3

This unit supports other RAID levels as well. However, it is not recommended to use them unless absolutely necessary.

In RAID0, the well-balanced access over all the hard disks can improve reliability compared with the single-unit hard disk, which frequently accesses only one hard disk.

In RAID1, high-reliability can be realized by the better utilization of disk data. Also, selecting a disk that can read data faster than others gains high accessibility.

In RAID 5 and RAID 0, the transfer data size becomes extremely large due to striping structure. Therefore, they are suitable for applications that handle large-sized files such as data retrieval.

In RAID 1 and RAID 5, since the function to reconstruct lost data due to hard disk failure is part of the operation, a larger number of hard disks are required compared with RAID 0 or when the disk array is not used.

For example, to configure a disk drive that uses a 4 GB hard disk with an user area of 8 GB, two hard disks are all that is needed for RAID 0 and RAID 7 (non-disk array system). In RAID 1, four disks (two primary and two mirroring disks) are required. In RAID 5, three disks (two primary disks and one redundant disk) are required.

Hot Swapping

Hot swapping allows a device to be replaced, such as a hard disk drive while its power is on, as listed below.

- Disk array system:
  Any failed hard disk drive can be replaced while the system is running.
- Power redundant system:
  When four power supplies are installed a failed power supply can be replaced by hot swapping.

Note: The fourth power supply is always the redundant.

Hot Plug PCI

Hot Plug PCI bus slots (for the secondary PCI bus) are located under the top cover of the server (see Figure 1-4). This PCI bus allows devices to be installed or removed while the server is powered on (if the operating system supports the Hot Plug PCI function.)

Note: Windows NT 4.0 does not support the Hot Plug PCI function.

Note: Your server may be configured so that the Hot Plug PCI access cover can not open.

Degradation

If a CPU or a memory DIMM board error was detected during execution of POST (Power On Self-Test) after system power is turned on, the degradation function isolates the failed CPU or memory DIMM board and continues operation. You should replace the failed device as soon as possible.

This function is enabled only when the following system requirements are met:

- Two or more CPUs are installed.
- Two CPU backboards (Tertiary cache) are installed
- Eight memory DIMM boards are installed.

A CPU or memory DIMM board error may be viewed on the screen while POST is running or by entering BIOS Setup." It may also be viewed when the ESMPRO program is installed and operating.

AC Linkage Mode

When the power cord of the server is connected to an uninterruptible power supply (UPS) unit, the server supports the power linkage function. This function controls the server power from the UPS. This mode can be switched by using the control switch on the rear panel.

Sleep Mode

The SLEEP mode switch on the front of the server is used for saving power.

If the SLEEP mode switch is pressed, then the server enters into the sleep state (the Drive Bay Power lamp and the Power lamp will blink simultaneously). In the power saving mode, the memory data and the states of the jobs are kept unchanged. In addition, the server in the power saving mode can accept accesses to hard disks from other machines on the network and perform other network jobs.

Sleep mode requires an operating system that supports its function.

> ***Note:*** Windows NT 4.0 does not support the Sleep mode function.

System Functions

The following subsections describe select system functions.

Automatic Rebuilding Function

The server supports the disk array automatic rebuilding function for data recovery.

> ***Note:*** The automatic rebuilding function supports a disk array configuration of RAID levels, RAID1, RAID5 or RAID6.

Rebuilding is to regenerate all data from a failed disk to a replacement disk. A rebuild is necessary after a failed disk drive is replaced with a new one.

In disk array configuration RAID levels, RAID1, RAID5, or RAID6 the failed disk does not affect the operation. However, if another disk error occurs before automatic rebuilding, the data may be destroyed. To prevent such an accident, it will rebuild after the failed disk has been replaced.

In a conventional server, the user must select and execute automatic rebuilding using various utilities. The server executes rebuilding automatically. Since the server also supports hot-swapping function, the failed disk can be replaced while the power is on.

If the disk array monitoring utility is installed, you may encounter the following indication and activity. The automatic rebuilding is successfully in progress unless the disk error LED on the disk, which you ran the automatic rebuilding lights (amber). This indicates a disk drive failure before completion of the rebuild.

- The message “Rebuild was canceled” appears on the screen during rebuilding.
- It may seem that rebuilding stops a moment and restarts.

Observe the following when using an automatic rebuilding function.

- Do not turn the power off. If power is turned off, automatic rebuilding will not start.
- Use an interval of 60 seconds or more between mounting and dismounting the hard disk drive.
- If a hard disk is being rebuilt, do not replace the hard disk.

Expand Capacity Function

Disk pack capacity can be expanded by adding a disk drive while the system is running. This function is only supported if the server is in the disk array configuration mode.

This function does not utilize operations such as data backup, pack reconfiguration, initialization, restoring the data.

If a hard disk is added under the operation of the Global Array Manager, perform the following.

- After the hard disk is installed, wait for about 60 seconds and click the Scan Device key. Clicking the Scan Device key after the execution of the expand array operation, will display the added disk correctly.

If a hard disk is added to the system operating in RAID level 0, the server is changed to the RAID6 level. Only RAID6 is available for this system when using the expand capacity function.

Remote Power-On (Wake On LAN) Function

The remote power-on function turns on the system power by way of a network or modem. If the system power is set to Off, it can be turned on remotely by sending a specific packet from the main computer to the remote system.

> ***Note:*** The standard default value of the remote power-on function is “Disabled”. To make it enabled, the Wake On LAN item in the System Hardware menu of the Setup Utility described in Chapter 6 “BIOS Configuration” must be changed to “Enable.”

2

Setting Up Your System

- Selecting a Site
- Unpacking the System
- Moving the System to the Site
- Getting Familiar With the System
- Making Connections
- Connecting the Power Cords
- Powering On Your System

Selecting a Site

The system operates reliably in a typical office environment. Choose a site that meets the following requirements.

- Site the system near grounded, three-pronged power outlets.

> ***Note:*** For the United States and Canada, this means NEMA 5-15R outlets for 100-120 VAC or NEMA 6-15R outlets for 200-240 VAC. For other international sites, this means three-pronged power outlets applicable for the electrical code of the region.

> **⚠ CAUTION**
> Be sure the power service connection is through a properly grounded outlet.

Each power cord can be plugged into a separate phase of a main AC supply, assuming the circuit is rated for that load.

> ***Note:*** For Denmark, the system must be connected to an AC power source rated at 16 amps.

- Select a site that is clean, dust-free, and well ventilated. Keep front and rear ventilating openings free of obstructions. Locate the system away from sources of heat, vibration, or physical shock
- Isolate the system from strong electromagnetic fields and electrical noise produced by electrical devices (such as air conditioners, large fans, large electric motors, radio and TV transmitters, and high-frequency security devices)
- The site should be spacious enough to provide at least six inches (15 centimeters) behind the system and on each side of the system for proper cooling, airflow, and cable clearance.
- Allow at least 11 inches (27 centimeters) in front of the system for proper front door clearance.
- Position the system for easy access for system maintenance and installation of system upgrades.

Unpacking the System

⚠ CAUTION

Your system weighs 165 pounds (75kg) or more with optional equipment. To avoid personal injury, make sure you have at least four person's help you lift or move the system.

When you receive your system, inspect the shipping containers prior to unpacking. If the shipping boxes are damaged, note the damage, and if possible, photograph it for reference. After removing the contents of the containers, keep the cartons and the packing materials. If the contents appear damaged when you unpack the boxes, file a damage claim with the carrier immediately. To unpack your system, see the unpacking instructions on the shipping carton.

Moving the System to the Site

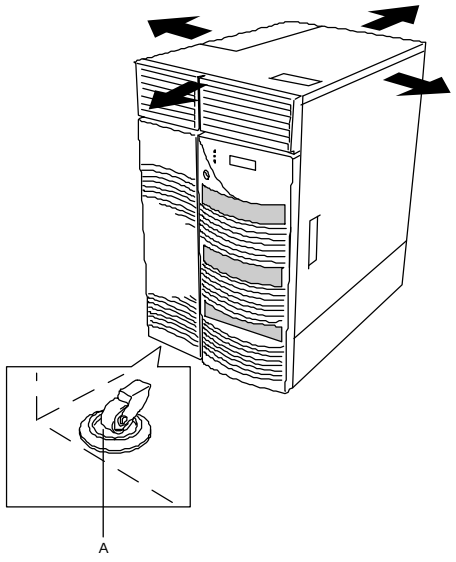
Once you have selected the system installation site, move the server system as follows.

1. Casters are provided on the bottom of the server. Slowly push the server to the selected installation location.

⚠ CAUTION

For safety reasons, be sure to attach the caster holders on the casters when the server is at the selected site.

2. To secure the server so that it won't move, attach a caster holder (A) to each of the server's casters as shown below.



Getting Familiar With the System

Before setting up your system, see *System Overview* in Chapter 1 of this User's Guide to become familiar with the system features, such as the location of your system's security keylocks and front and rear panel switches, indicators and connectors, etc.

Making Connections

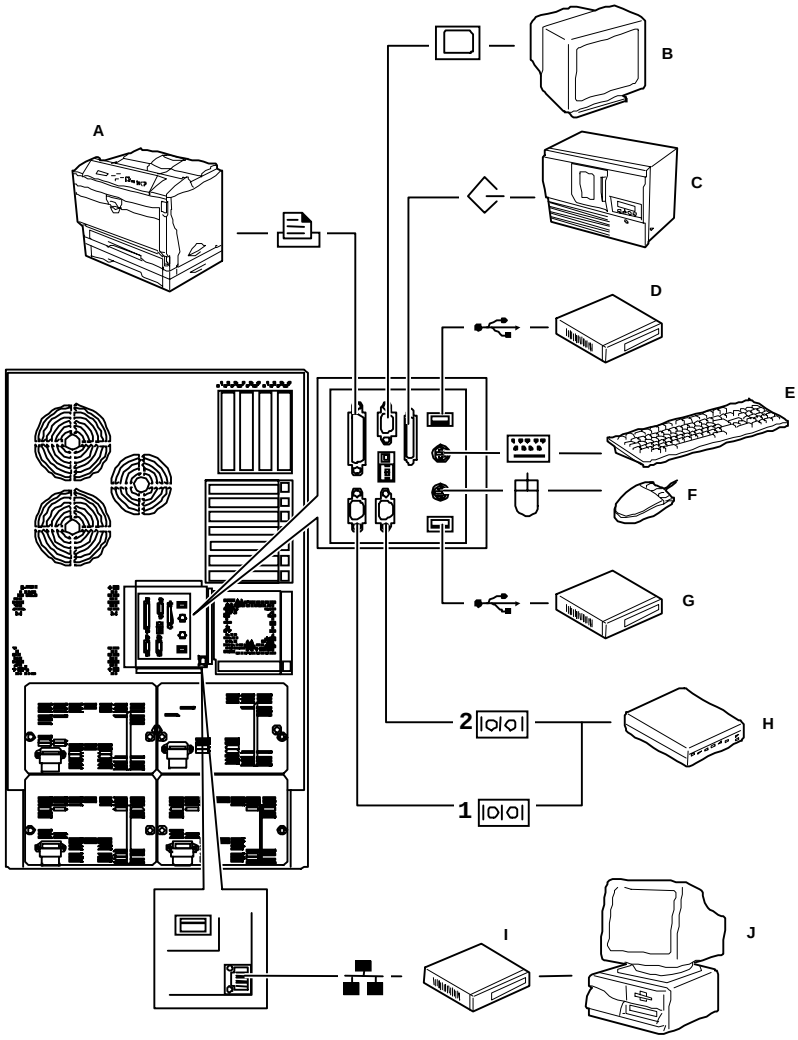
Connect your keyboard, monitor, and mouse (see Figure 2-1). Connect any external peripheral devices such as a printer or modem by following the instructions included with these devices. To connect external SCSI cables, refer to *Cabling* in Appendix A.

⚠ CAUTION

Damage to the system may result if the keyboard cable is inserted or removed when power is applied to the system.

⚠ CAUTION

Inserting a telephone line connector into a LAN board RJ-45 port may result in personal injury and equipment damage.



A. Printer with parallel interface

B. Monitor display unit

C. External SCSI device*

D Device with USB interface such as a terminal adapter. Requires NOS that supports the USB interface.

E Keyboard

F. Mouse

G. Device with USB interface such as a terminal adapter. Requires NOS that supports the USB interface.

H. Device with the serial interface such as a modem

I. Hub (multi-port repeater)

J. Network system on LAN (connected via a hub)

* SCSI devices may be connected to connectors other than the standard external SCSI connector.

Figure 2-1. Making Connections

Connecting the Power Cords

Plug the female end of each AC power cord into the input receptacles on the rear of the power supplies (see Figure 2-2). Plug the male end of each power cord into NEMA 5-15R outlet for 100-120 VAC or NEMA 6-15R outlet for 200-240 VAC. If the power cords supplied with the system are not compatible with the AC wall outlet in your region, obtain a suitable power cord that meets the following criteria.

- The power cord must be rated for the available AC voltage and have a current rating that is at least 125% of the current rating of the system.
- The power cord connector that plugs into the wall outlet must be terminated in a grounding-type male plug designed for use in your region. It must have certification marks showing certification by an agency acceptable in your region.
- The power cord connector that plugs into the system must be an IEC-type CEE-22 female connector.
- The power cord must be less than 1.8 meters (6.0 feet) long.

After connecting a power cord, make sure to secure the cord with the tie-wrap on the side of the power unit, so that the power cord is not accidentally pulled out of its receptacle.

After the power cord is plugged in confirm that the two power status lamps on the power unit are lit. If either or both lamps are off, a failure occurred in the power unit, see *System Status LED Indicators* in Chapter 1 of this User's Guide.

When connecting the power cord to a power control unit such as an UPS, confirm that the power control unit is powered off. Connecting the power cord while power is supplied to the power control unit may cause a failure.

To automatically turn on/off the system via the AC-LINK function when a power cord is connected to an UPS, follow the BIOS configuration instructions in Chapter 3 to change the internal settings of the server.

⚠ WARNING

Your system shipped with four AC power cords. Do not attempt to modify or use the supplied AC power cords if it is not the exact type required.

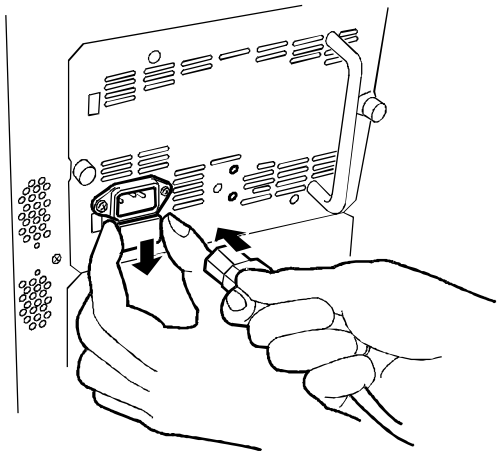


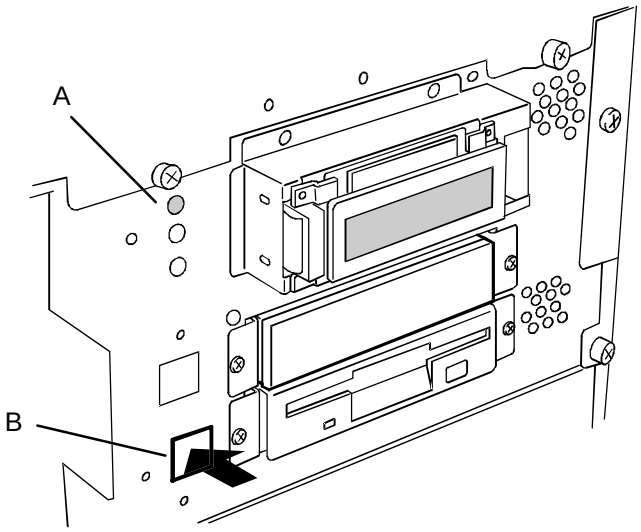
Figure 2-2. Connecting the AC Power Cord

Powering On Your System

Power on your system as follows.

1. Make sure all external devices, such as a video display, keyboard, and mouse (optional) have been connected, and the power cords are connected.
2. Power on the video display and any other external devices.
3. Open the right front door and press the power on/off switch (B) on the front panel (see Figure 2-3).
4. Verify that the Power LED (A) is lit. If it is not lit, ensure the AC power cords are connected to functional AC power sources.

After a few seconds your system begins the internal Power-On Self Tests (POST). POST automatically checks the system, CPU module, memory, keyboard, and most installed peripheral devices. If you have problems powering on your system, refer to *Problem Solving* in Chapter 6.



A. Power LED

B. Power ON/OFF Switch

Figure 2-3. Powering On Your System

3

Configuring Your System

- Configuring Your System
- BIOS Setup Utility
- Symbios Configuration Utility
- Configuring the RAID Controller
- Configuring System Jumpers and Switches

Configuring Your System

Configuration and setup utilities are used to change your system configuration. You can configure your system, as well as any option boards you may add to your system, using the BIOS Setup (stored in the system FLASH memory). A diskette is not needed to run BIOS Setup.

The Symbios Configuration Utility stored in the system FLASH memory is used if you need to configure the SCSI controller in your system or to perform a SCSI disk format or verify disk operation of these drives. A diskette is not needed to run Symbios Configuration.

If your system has been factory configured, the BIOS Setup or Symbios Configuration utilities do not need to be run unless you want to change the password or security features, add option boards or devices, or upgrade the boards in your system.

The following sections provide procedures for running the BIOS Setup. Also, a section describing the system jumper configurations is presented. Several configuration tables are also provided to record changes you make to the default system configuration.

BIOS Setup Utility

The BIOS Setup Utility is used to change system configuration parameters. The utility is resident in the system FLASH memory and does not require a diskette or an operating system present to run.

When to Use the BIOS Setup Utility

In most cases, it is not necessary to run the BIOS Setup Utility to change the default parameters, since the default settings support most system configurations. In the following cases, however, you should initiate this utility to change the default settings.

- **When the set parameters are incorrect:** The parameters set with the BIOS Setup Utility are stored to nonvolatile memory called CMOS. If the contents of CMOS have been destroyed for some reason, an error message appears on the display during the execution of POST (Power On Self-Test). When an error message appears, press the F2 key to enter the BIOS Setup Utility.
- **When CMOS is cleared:** A jumper is provided on the system I/O board with which you can clear the contents of CMOS. If this jumper is used to clear the contents of CMOS, a message appears requesting you to run the BIOS Setup Utility during the execution of POST. Run the BIOS Setup Utility according to the instructions displayed on the screen and provide necessary settings.
- **When the boot device priority is changed:** The defaults instruct your server to search the boot devices in the following order: floppy disk drive, CD-ROM drive, then the hard disk drive. If you want to change the boot order priority, run the BIOS Setup Utility to change the settings. Also, please note that the BIOS defaults are floppy disk drive, hard disk drive, and CD-ROM drive.
- **When you replace a processor or memory:** Your server has a degradation function allowing continuation of operation in the event of a processor or memory error. After replacing the failed processor or memory, run the BIOS Setup Utility to clear the error information.
- **When you change cache memory configuration:** Run the BIOS Setup Utility to enable or disable the memory cache, or to set the cache in memory areas such as system BIOS or video BIOS.
- **When you change a setup for a PCI or ISA board:** Run the BIOS Setup Utility to configure the interrupt request (IRQ) for PCI/ISA devices and PCI and ISA bus slots. Parity error can also be setup for PCI devices.
- **When using the remote power-on function:** Enable or disable the remote power-on (Wake On LAN) function, which is used to power up your server remotely through a network.

- **When using the AC link function:** AC link allows you to configure the power ON/OFF state of your server when AC power is restored after a power failure. Run the BIOS Setup Utility to change the power ON/OFF state of your server after a power failure.
- **When enabling and changing password and other security features:** The BIOS Setup Utility includes password setup features and related security features. Run BIOS Setup to enable and change these features. (Do not set the password and security features before installing the operating system.)
- **When installing an ISA board (not Plug-n-Play):** The resources (IRQ, memory, I/O) used by the board must be reserved so that there is no conflict with Plug-n-Play controllers.
- **Other:** You can also change other BIOS settings including date/time, keyboard features, and standard I/O (serial Port and printer port) interrupt. However, these features can also be changed from your operating system menus.

Using the BIOS Setup Utility

You access the BIOS Setup Utility when you turn on or reboot your system. To run the BIOS Setup Utility, perform the following procedure.

1. Power on or reboot the system. BIOS displays the following:

   Press <F2> to enter SETUP

2. Press **F2**. After BIOS POST completes, the BIOS Setup Utility starts and the Main Menu is displayed. The menu bar at the top of the Main Menu lists the following selections.

Menu	Use
Main	Use this menu for basic system configuration.
Advanced	Use this menu for setting the Advanced Features available on your system.
Security	Use this menu to set User and Supervisor Passwords and the Backup and Virus-Check reminders.
System Hardware	Use this menu for configuring unique Server Features.
Boot	Use this menu to change the boot order of devices in your system.
Exit	Exits the current menu.

Use the arrow keys to select a menu or an item on a displayed menu. Press the value keys (listed in the table below) to cycle through the allowable values for the selected field. Use the Exit menu's "Save Values" selection to save the current values on all the menus.

To display a submenu, position the cursor on a selection that has a submenu and press **Enter**. Selections with submenus are preceded by an arrow.

See the following table for information on the keys you use with Setup. These keys are also listed at the bottom of the Setup menu.

Key	Function in Setup Menu
F1 or Alt-H	General Help window.
ESC	Exit the current menu.
Left or Right	Select a different menu.
Up or Down	Move cursor up and down. The cursor moves only to the settings that you can change.
HOME or END	Move cursor to top or bottom of window.
F5 or -	Select the previous value for the field.
F6 or + or SPACE	Select the next value for the field.
F9	Load default configuration values for this menu.
F10	Save current value and exit
ENTER	Execute command or Select ➨ submenu.

BIOS Setup Configuration Settings

Table 3-1 shows the normal settings for the BIOS Setup Utility and provides a place for you to record any changes you make to these settings.

Table 3-1. BIOS Setup Configurations, Main Menu

Menu Parameter Name	Normal Setting or Display Only	Your Configuration
MAIN MENU		
Processor Type	Displays the type of processor installed.	
Processor Speed	Displays the processor speed.	
Cache RAM	Displays the cache RAM size.	

Table 3-1. BIOS Setup Configurations, Main Menu

Menu Parameter Name	Normal Setting or Display Only	Your Configuration
Cache Memory Press Enter for menu.		
Memory Cache	Enabled	
Cache System BIOS Area	Write Protected	
Cache Video BIOS Area	Write Protected	
Cache Base 0 - 512K	Write Back	
Cache Base 512K - 640K	Write Back	
Cache Extended Memory Area	Write Back	
Cache C800-CBFF	Disabled	
Cache CC00-CFFF	Disabled	
Cache D000-D3FF	Disabled	
Cache D400-D7FF	Disabled	
Cache D800-DBFF	Disabled	
Cache DC00-DFFF	Disabled	
System Memory	640KB (display only) Indicates the total capacity of the basic memory.	
Extended Memory	XXXMB (display only) Indicates the total capacity of the extended memory.	
Language	English	
BIOS Version	Indicates the version of the system BIOS. (display only)	
System Time Enter current time (hour, minutes, seconds on 24 hour clock).	Current Time	
System Date Enter current date (month, day, year).	Current Date	
Floppy Options		
Diskette A: Use +/- to change values; indicates the type of diskette drive installed.	1.44/125 MB, 3 1/2”	
Diskette B: Use +/- to change values; indicates the type of diskette drive installed (Not Installed in your system).	Not Installed	

Table 3-1. BIOS Setup Configurations, Advanced Menu

Menu Parameter Name	Normal Setting or Display Only	Your Configuration
ADVANCED MENU		
Advanced Press **Enter** for menu.		
Plug & Play OS	No	
Reset Configuration Data	No	
Address Bit Permuting	Enabled	
ROMPilot Support	Disabled	
Memory Reconfiguration Press **Enter** for menu.		
Memory Reconfiguration	Enabled	
DIMM Bank #1 Status	Normal (Display only)	
DIMM Bank #2 Status	Normal (Display only)	
DIMM Bank #3 Status	Normal (Display only)	
DIMM Bank #4 Status	Normal (Display only)	
DIMM Bank #5 Status	Normal (Display only)	
DIMM Bank #6 Status	Normal (Display only)	
DIMM Bank #7 Status	Normal (Display only)	
DIMM Bank #8 Status	Normal (Display only)	
Clear DIMM Errors	Press Enter to clear DIMM errors	
DIMM Error Pause	Enabled	
CPU Reconfiguration Press **Enter** for menu.		
CPU Reconfiguration	Enabled	
CPU #1 Status	Normal (Display only)	
CPU #2 Status	Normal (Display only)	
CPU #3 Status	Normal (Display only)	
CPU #4 Status	Normal (Display only)	
CPU #5 Status	Normal (Display only)	
CPU #6 Status	Normal (Display only)	
CPU #7 Status	Normal (Display only)	
CPU #8 Status	Normal (Display only)	
Clear CPU Errors	Press Enter	
CPU Error Pause	Enabled	

Table 3-1. BIOS Setup Configurations, Advanced Menu

Menu Parameter Name	Normal Setting or Display Only	Your Configuration
L3 Cache Reconfiguration Press **Enter** for menu.		
L3 cache Reconfiguration	Enabled	
CPU Box #1:		
Address Array Status	Normal	
Data Array Status	Normal	
CPU Box #2:		
Address Array Status	Normal	
Data Array Status	Normal	
Clear L3 cache Errors	Press Enter	
L3 cache Error Pause	Enabled	
Peripheral Configuration Press **Enter** for menu.		
Serial Port 1:	Enabled	
Base I/O Address:	3F8	
Interrupt:	IRQ4	
Serial Port 2:	Enabled	
Base I/O Address:	2F8	
Interrupt:	IRQ 3	
Parallel Port:	Enabled	
Parallel Mode:	ECP	
Base I/O address:	378	
Interrupt:	IRQ 7	
DMA Channel:	DMA 3	
Diskette Controller:	Enabled	
Mouse	Auto Detect	
SCSI controller	Enabled	
LAN controller	Enabled	
Monitoring Configuration Press **Enter** for menu.		
POST Monitoring Observation	POST-END	
Boot Monitoring	Disabled	
Boot Monitoring Timeout Period (Parameter is not displayed when Boot Monitoring is disabled.)	5	

Table 3-1. BIOS Setup Configurations, Advanced, Security, and System Hardware Menus

Menu Parameter Name	Normal Setting or Display Only	Your Configuration
PCI Device Press **Enter** for menu.		
PCI IRQ line 1 — PCI IRQ line 3 (See Table 3-2. PCI IRQ Mapping)	Auto Select	
PCI Parity Error		
PCI Bus#1 Parity Error	Disabled	
PCI Bus#2 Parity Error	Disabled	
PCI Bus#3 Parity Error	Disabled	
ISA Device Press **Enter** for menu.		
IRQ	None	
DMA Channel	None	
Memory Size	None	
Memory address	None	
Enable Extended Memory Gap	Disabled	
Numlock Press **Enter** for menu.		
Numlock	Auto	
Key Click	Disabled	
Key Board auto-repeat rate	10/sec	
Key Board auto-repeat delay	1 sec	
SECURITY MENU		
Supervisor Password is	Disabled (Enabled is displayed when password is entered.)	
User Password is	Disabled (Enabled is displayed when password is entered.)	
Set Supervisor Password	Press Enter	
Set User Password	Press Enter	
Password on boot	Disabled	
Diskette Write	Normal	
Power Switch Mask	Unmasked	
Option ROM Menu Mask	Unmasked	
Processor serial number	Disabled	

Table 3-1. BIOS Setup Configurations, System Hardware Menu and Boot Menu

Menu Parameter Name	Normal Setting or Display Only	Your Configuration
SYSTEM HARDWARE MENU		
Thermal Sensor Press **Enter** for menu.		
Thermal Sensor	Enabled	
Upper Limit	53 (Setting is not displayed when "Thermal Sensor" is disabled.)	
Lower Limit	5 (Setting is not displayed when "Thermal Sensor" is disabled.)	
Wake On LAN	Disabled	
AC-LINK	Last State (Setting is not displayed when "Wake On LAN" is enabled.)	
ESM IRQ	IRQ 13	
SMI	Yes	
Error Log Initialization	No	
BOOT MENU Press **Enter** for menu		
First boot device	Diskette Drive	
Second boot device	8xx SCSI CD-ROM Symbios	
Third boot device	Hard Drive	

Exiting BIOS Setup

To exit Setup, select Exit from the menu bar to display the Exit Setup menu.

The following describes the options on this menu. Note that ESC does not exit this menu. Select one of the items from the menu or menu bar to exit this menu.

Selection	Description
Save changes and Exit	Stores the selections displayed in the menus in CMOS and exits the Setup program.
Exit without Saving Changes	Exits the program without saving any changes you have made in this session. Previous selections remain in effect.
Get Default Values	Displays default values for all Setup menus. Useful if BIOS detects a problem with the values stored in CMOS.
Load Previous Values	Reverts to previously saved values if the new values have not been saved to CMOS.
Save Changes	Stores the current selections without exiting the Setup program.

PCI IRQ Mapping

Table 3-2 shows the menu items (PCI IRQ Line) and the assignment of the PCI bus or PCI controller on the system I/O board.

Table 3-2. PCI IRQ Mapping

PCI IRQ Line	PCI BUS or PCI Controller
1	SCSI controller on system I/O board PCI Slot #11 (Int B, INT C, INT D) PCI Slot #12 (Int B, INT C, INT D) PCI Slot #13 (Int B, INT C, INT D) PCI Slot #21 (Int B, INT C, INT D) PCI Slot #22 (Int B, INT C, INT D) PCI Slot #23 (Int B, INT C, INT D) PCI Slot #24 (Int B, INT C, INT D) PCI Slot #31 (Int D) PCI Slot #32 (Int B, INT C, INT D) PCI Slot #33 (Int A, INT B, INT C, INT D) PCI Slot #34 (Int A, INT B, INT C, INT D)
2	PCI Slot #22 (Int A) PCI Slot #23 (Int A) PCI Slot #24 (Int A) PCI Slot #31 (Int A, INT C) PCI Slot #32 (Int A)
3	Video controller on system I/O board LAN controller on system I/O board PCI Slot #11 (Int A) PCI Slot #12 (Int A) PCI Slot #13 (Int A) PCI Slot #21 (Int A) PCI Slot #31 (Int D)

Symbios Configuration Utility

The Symbios Configuration Utility detects the SCSI host adapter located on the system board. Use the utility to:

- Change adapter and SCSI device default values
- Check and/or change SCSI device settings that may conflict with those of other devices in the server.
- Perform low-level formatting or verify operations on SCSI disk drives.

Running the Symbios Configuration Utility

1. Power-on the system. The system boots up.
2. When this message appears on the video monitor:

   Press Ctrl-C to start the Symbios Configuration Utility

   Press **Ctrl+C** to run this utility.
3. The utility starts and the Main Menu displays.

Symbios Configuration Utility Main Menu

Adapter	Port Number	IRQ Level	Status		NVRAM Found
			Current	Next Boot	
SYM53C895	4000	11	On	On	Yes

Change Adapter Status – Press ENTER to Enable/Disable on next boot.

Adapter Boot Order – Not used.

Additional Adapter Configuration – Not used.

Display Mode-Verbose – Press ENTER to change display mode.

Mono/Color – Press ENTER to change display from black/white to color.

Language – Not used.

Help

Quit

The following keys are active for all SCSI Configuration screens:

Key	Action
Arrows	Up and down arrows move from one parameter to another within a screen.
ENTER	Displays options for a configurable parameter. Selects an option.
ESC	Moves back to previous screen or parameter or EXIT if at the Main menu.

Changing the Adapter and Device Configurations

The Symbios Configuration Utility Main Menu lists the onboard SCSI adapter and shows its current settings. The adapter listed controls any SCSI removable media devices installed in your system.

1. Using the arrow keys, select the adapter you want to reconfigure. Press **ENTER**.
2. Select "Adapter Setup" and press **ENTER**. The Adapter Setup screen displays.

Adapter Setup Screen

Description	Recommended Setting or Display Only	Your Configuration: SYM53C895 Adapter
SCAM Support	Off	
Parity	On	
Host SCSI ID	7	
Scan Order	Low to High	
Removable Media Support	None	
CHS Mapping	SCSI Plug and Play Mapping	
Spinup Delay (Secs)	2	
Help		
Restore Default Setup		
Exit this menu		

3. Highlight the function you want to change and press **ENTER**. You will be prompted to save changes when you exit the configuration utility.

To change device configuration parameters, perform the following steps:

1. At the Symbios Configuration Utility Main Menu, select the adapter which connects to the SCSI device you are reconfiguring. The first adapter listed controls the operation of the hard disk drives; the second adapter controls any SCSI removable media devices installed in your system. Press **ENTER**.
2. Select "Device Selections" and press **ENTER**. The Devices 0 to 7 screen displays.
3. Select the SCSI device you are reconfiguring and press **ENTER**. When configuring SCSI Removable Media Devices, refer to the SYM53C895 Adapter Table below for recommended settings.

SYM53C875 Adapter – SCSI Removable Media Devices

Description	Recommended Setting or Display Only	Your Configuration	
		Device	Setting
Device Selections	Select device and press ENTER.		
Sync Rate	20		
Width (bits)	8		
Disconnect	On		
Read/Write I/O timeout (sec's)	10		
Scan for device at boot time	Yes		
Scan for SCSI LUNS	Enabled		
Queue Tags	On		
Format Device			
Help			
Restore Default Setup			
Exit this Menu			

4. Highlight the function you want to change and press **ENTER**. You will be prompted to save changes when you exit the configuration utility.

Note: If you wish to format a disk or verify disk media, select “Format” or “Verify” from the Device Setup menu.

Configuring the RAID Controller

The system includes a three channel SecuRAID 530 Redundant Array of Inexpensive Devices (RAID) Controller board (Mylex eXtremeRAID 1100). This board gives your system the added security of fault tolerance and is pre-configured at the factory. Use Table 3-3 to determine how your RAID controller was configured at the factory. If you want to change the RAID level or add additional hard disks to the array, use the RAID Configuration Utility.

If you are adding the RAID controller to an existing system, the RAID Configuration Utility allows you to configure your disk array before installing your network operating system.

Table 3-3. RAID Configurations

Number of Hard Drives	RAID Level Configured	Hard Drives in Array	Description
2	0	2	**Block Striping (RAID 0)** Data is block striped across drives without redundancy. The array consists of a minimum of two ON-LINE drives.
2	1	2	**Mirroring (RAID 1)** Drives are paired and mirrored. All data is 100% duplicated on an equivalent drive (fully redundant).
3	5	3	**Striping with Parity (RAID 5)** Data is striped across several physical drives. Parity protection is used for data redundancy.
4 or more	5	4 (one standby drive)	**Striping with Parity (RAID 5) with a standby drive** The array consists of three ON-LINE drives and one STANDBY drive. The standby replacement drive, or hot spare, is one of the most important features RAID provides to achieve automatic, non-stop service with a high degree of fault-tolerance.

The RAID Configuration Utility utility is included with the RAID controller. The SecuRAID 530 controller supports various versions of RAID technology (referred to as RAID levels). To use any RAID level, you must configure the RAID controller using the RAID Configuration Utility configuration utility prior to installing your Network Operating System. For an explanation of this utility, refer to the *RAID Configuration Utility Utilities Installation Guide and User Manual* that was shipped with the controller. Chapter 2 of the manual (*Configuration Strategies)* describes RAID technology and provides tips on making your array perform well in your specific application. Chapter 3 (*Preparing the Array)* covers array hardware preparation, configuration, and initialization. After completing the steps in Chapter 3, you can install your Network Operating System.

If you want to remotely configure the array (from a PC client); increase array capacity online; or monitor statistics on disk and controller activity, you must install the Global Array Manager (GAM) option provided with your RAID subsystem. The GAM option includes diskettes and user documentation. Use of GAM is documented in the *Global Array Manager 2 Server Installation Guide*. Increasing array capacity is covered in the *MORE User Guide*. This user guide covers enhancements to both the Global Array manager and RAID Configuration Utility utilities software that implement online RAID expansion (MORE) technology.

Configuring System Jumpers and Switches

This section describes the jumpers and switches used on the I/O riser board, memory board, and the system I/O board.

Before You Begin

Only a qualified technical person should perform the procedures in this section.

> ***Note:*** Electrostatic discharge (ESD) can damage the system boards. Modify the boards only at an ESD workstation. Otherwise, wear an antistatic wrist strap attached to chassis ground.

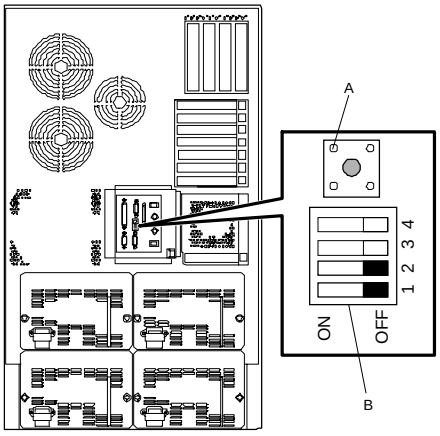
The system jumpers enable you to set specific operating parameters for your system. A jumper is a small plastic-encased conductor (shorting plug) that slips over two jumper pins.

Configuring I/O Riser Board Function Select Switches

The following describes how to configure and set the I/O riser board function select switches for specific operating parameters. The function select DIP switches configure the use of the rear panel reset/dump button.

> **⚠ CAUTION**
>
> Before doing the procedures in this section, make sure that your system is powered off. Unplug all AC power cords from the back of the chassis. Failure to disconnect power before setting switches and moving jumpers can result in personal injury and equipment damage.

Figure 3-1 shows the DIP switches. The switches consist of a block of four switches, accessible on the I/O panel located on the I/O riser board at the rear of the chassis.



Function Select Switches and Reset/Dump Button

A Reset/Dump button

B Function select switches

(Switches shown in factory default position.)

Figure 3-1. Function Select Switches

> ***Note:*** The switches are set correctly at the factory for your system configuration. If your system requires a switch change, change only the switch setting for that condition. Otherwise keep the switches at their factory settings.

Table 3-4 shows the switch configurations and functions. Set or change the switches per Table 3-4 and the following steps.

> ***Note:*** Power must be completely off before setting the switches, otherwise the settings will not be recognized.

1. At the front of the server, press the power switch off.
2. At the rear of the server, locate the Function Select DIP switch (see Figure 3-1) that you want to change.
3. Set the appropriate switch on or off, according to Table 3-4.

> ***Note:*** If you set SW3 to On for use with an optional UPS unit, power the unit up before switching power on the server.

4. Press the main power switch on.

Table 3-4. Function Select Switch Settings

Switch	Description	Settings	Function
SW1	Dump/Reset pushbutton control	Off (factory setting)	Enables the Reset/dump button.
		On	Disables the Reset/dump button.
SW2	Dump/Reset pushbutton mode control	Off (factory setting)	Sets the Reset/dump button to Reset mode. Pressing the button resets the system.
		On	Sets the Reset/dump button to Dump mode. Pressing the button dumps the system memory. This function used only by qualified technical personnel.
SW3	Reserved for future use.	Off (factory setting) On	
SW4	Reserved for future use.	Off (factory setting) On	

Configuring Memory Board Function Jumpers

The system memory board jumpers enable you to specify the DIMM speed parameter. Figure 3-3 shows the location of the jumpers. The jumpers should be configured for 50ns (default setting) as shown in Figure 3-2.

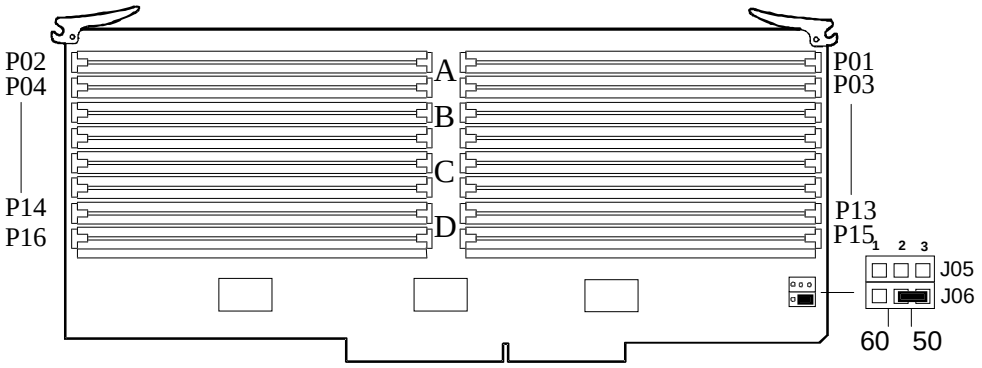


Figure 3-2. Memory Board Jumpers

Configuring System I/O Board Switches and Jumpers

The system I/O board jumpers enable you to set specific operating parameters for your system. Figure 3-3 shows the location of the jumpers. Table 3-5 lists the system I/O board switches and jumpers and their factory default settings.

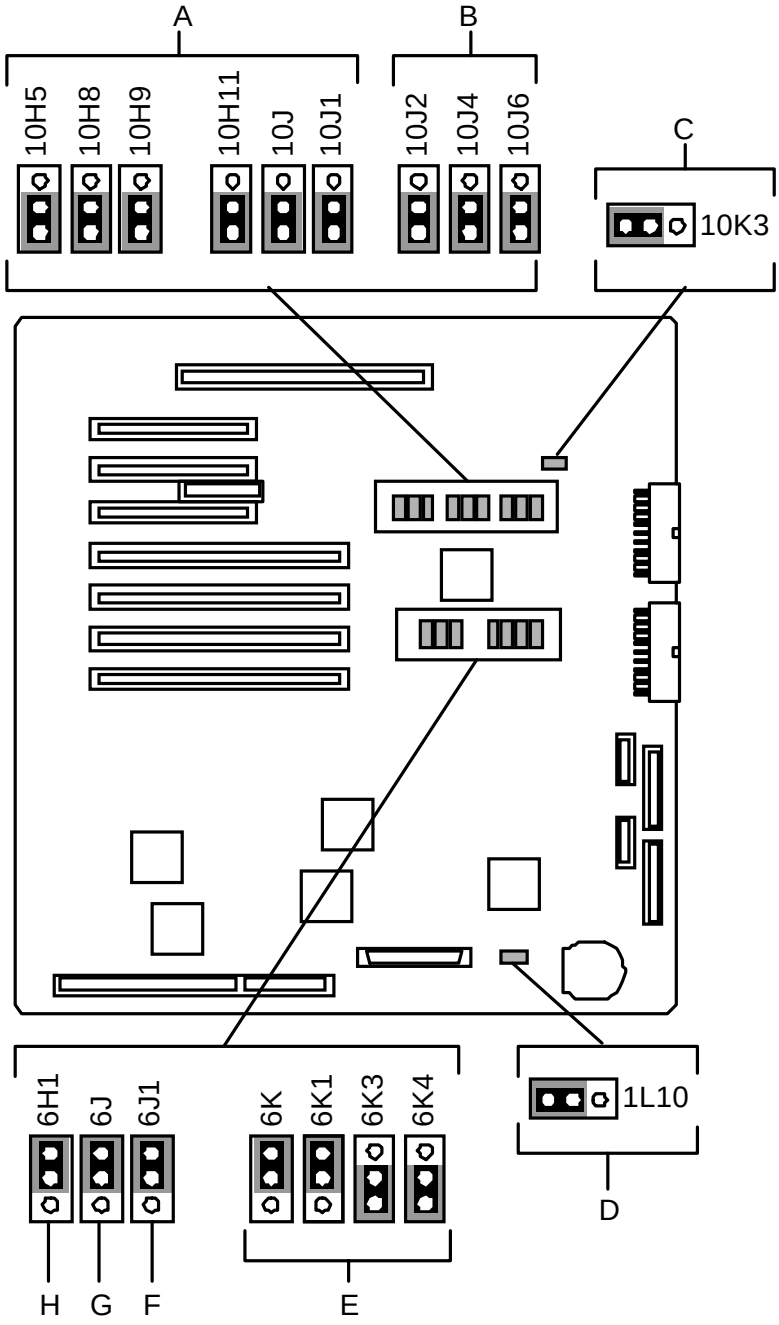


Figure 3-3. System I/O Board Switches and Jumpers

Table 3-5. System I/O Board Jumper Configurations

Figure 3-3 Callout	Description	Option	Jumper	Setting	Factory Default	Your Setting
A	Reserved	None Required on factory default (1-2)	10H5 10H8 10H9 10H11 10J 10J1	1-2 1-2 1-2 1-2 1-2 1-2	1-2 1-2 1-2 1-2 1-2 1-2	1-2 1-2 1-2 1-2 1-2 1-2
B	Reserved	None Required on factory default (1-2)	10J2 10J4 10J6	1-2 1-2	1-2 1-2	1-2 1-2
C	BIOS Flash ROM	**Disable** Enable	10K3	1-2	1-2	1-2
D	Power Supply	**Disable** Enable	1L10	1-2	1-2	1-2
E	Processor Speed	500 MHz	6K 6K1 6K3 6K4	2-3 2-3 1-2 1-2	2-3 2-3 1-2 1-2	2-3 2-3 1-2 1-2
F	Test Mode	**Disable** Enable	6J1	2-3	2-3	2-3
G	CMOS	**Disable** Enable	6J	2-3 1-2	2-3	
H	Password	**Enable** Disable	6H1	2-3 1-2	2-3	

Setting Switches and Jumpers

⚠ CAUTION

Before doing the procedures in this section, make sure that your system is powered off. Unplug the AC power cords from the back of the chassis. Failure to disconnect power before moving the jumpers can result in personal injury and equipment damage.

Note: Observe static precautions. Use an antistatic wrist strap.

Change the setting of any of the configuration switches or jumpers on the system boards as follows.

1. Power off the system and remove the covers as described in Chapter 4, "Upgrades and Options."
2. Check to ensure the system power cords are removed from the back of the system.
3. Locate the switch or jumper you are changing.
4. To change a switch setting, use a pen or your finger to move the switch to the desired setting. To change a jumper setting, use a pair of needle-nose pliers or your fingers to remove the jumper from its current location. Position the jumper over the two pins for the desired setting and press it onto the pins. Be careful not to bend the pins. Record changes to the board settings.
5. Install the system covers and power up the system.

4

Upgrading Your System

- Precautions
- Preparing Your System for Upgrade
- Modifying the System I/O Board
- DIMMs
- Processors
- Optional CPU Backboard
- Option Boards
- Power Supply
- Removable Media Devices
- Hard Disk Drives

This section contains step-by-step instructions for removal and installation of all the major system components. When you disassemble the server, note the orientation and placement of any cables or shielding that you remove.

⚠ WARNING

The DC push button on/off switch on the front panel does not turn off system AC power. Also, +5vdc is present on the system board whenever the AC power cord is connected between the system and an AC outlet. Before performing any procedures, first power off the DC by pushing the power on/off button located on the front panel. Make sure your system is powered off and the AC power cord is unplugged from the system. Failure to disconnect power before opening your system can result in personal injury and equipment damage.

⚠ CAUTION

The server management logic on the system board monitors system voltage changes. When powering down your system, you may experience a 1- to 5-second delay from the time you press the push button power on/off switch and your system powering down. This is normal system operation and is required by the server management logic.

⚠ CAUTION

Operating your system with the access cover removed can damage system components. For proper cooling and airflow, always replace the access cover before powering on.

Precautions

The following warnings and cautions apply throughout this chapter. Only a technically qualified person should integrate and configure the system.

The only procedures that can safely be done with the system power on is removing or installing (hot-swapping) an SCA drive/carrier assembly in one of the SCSI hot-swap drive cages, hot-swapping a failed power supply, or hot swapping a hot plug PCI board. For any other procedures inside the system, turn off system power and disconnect the AC power cord s.

⚠ WARNING

Before doing the procedures in this chapter, make sure that your system is powered off and unplug all AC power cords. Failure to disconnect power before opening your system can result in personal injury and equipment damage.

System power on/off. The DC push-button on/off switch (a convex button) on the front panel DOES NOT turn off the system AC power. To remove power from system, you must unplug the AC power cords (from wall outlets or power supply).

Hazardous conditions, power supply. Hazardous voltage, current, and energy levels are present inside the power supply. There are no user serviceable parts inside it; servicing should be done by technically qualified personnel.

Hazardous conditions, devices & cables. Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the system and disconnect the power cords, telecommunications systems, networks, and modems attached to the system before opening it. Otherwise, personal injury or equipment damage can result.

⚠ CAUTION

Electrostatic discharge (ESD) and ESD protection. ESD can damage disk drives, boards, and other parts. This system can withstand normal levels of environmental ESD while you are hot-swapping SCSI hard drives or hot-swapping a failed fan module or power supply. However, we recommend that you do all procedures in this chapter only at an ESD workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground (any unpainted metal surface) on your system when handling parts.

ESD and handling boards. Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the system, place it component-side up on a grounded, static-free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

Chassis covers, proper cooling and airflow. For proper cooling and airflow, always install the chassis side and top covers before turning on the system. Operating it without these covers in place can damage system parts.

Contact your sales representative or dealer for a list of approved optional peripheral devices.

Preparing Your System for Upgrade

Have the following tools available:

- Phillips screwdriver (#2 bit)
- flat-head screwdriver
- small needle nose pliers
- pen or pencil
- utility knife
- ESD workstation or antistatic wrist strap (recommended)
- IC removal tool.

Equipment Log

Use the equipment log form located at the end of this guide to record the model and serial number of your system, all installed options, and any other pertinent information specific to your system. You need this information when configuring your system.

Removing the Top Panel and Front Doors

You must remove the top panel and front doors in order to remove the side panels on your system. To remove the top panel and front doors, perform the following.

1. Open the front doors and power off the system. Ensure the power cords are unplugged from the AC wall outlet.
2. Loosen the screw securing the top panel (A), see Figure 4-1.
3. While holding the top panel, lift it straight up and then pull forward to remove it

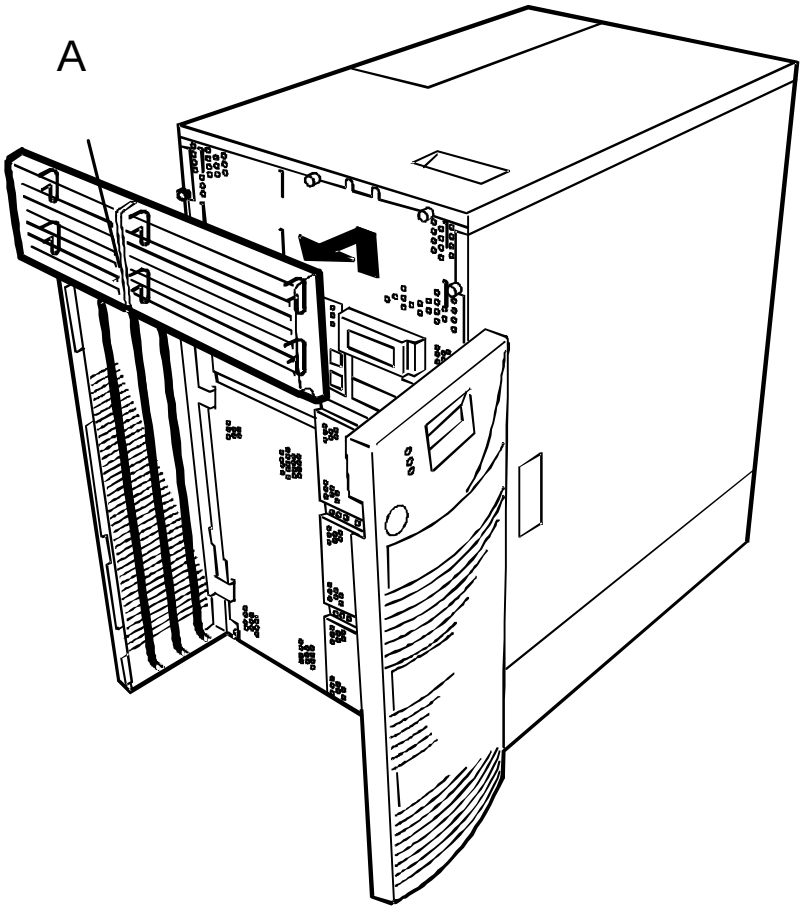


Figure 4-1. System Top Panel

4. Slightly lift one of the front doors and pull it towards you (see Figure 4-2). The mounting pins of the front door are disengaged from their mounting holes on the front of the system.
5. Remove the other front door in the same manner.

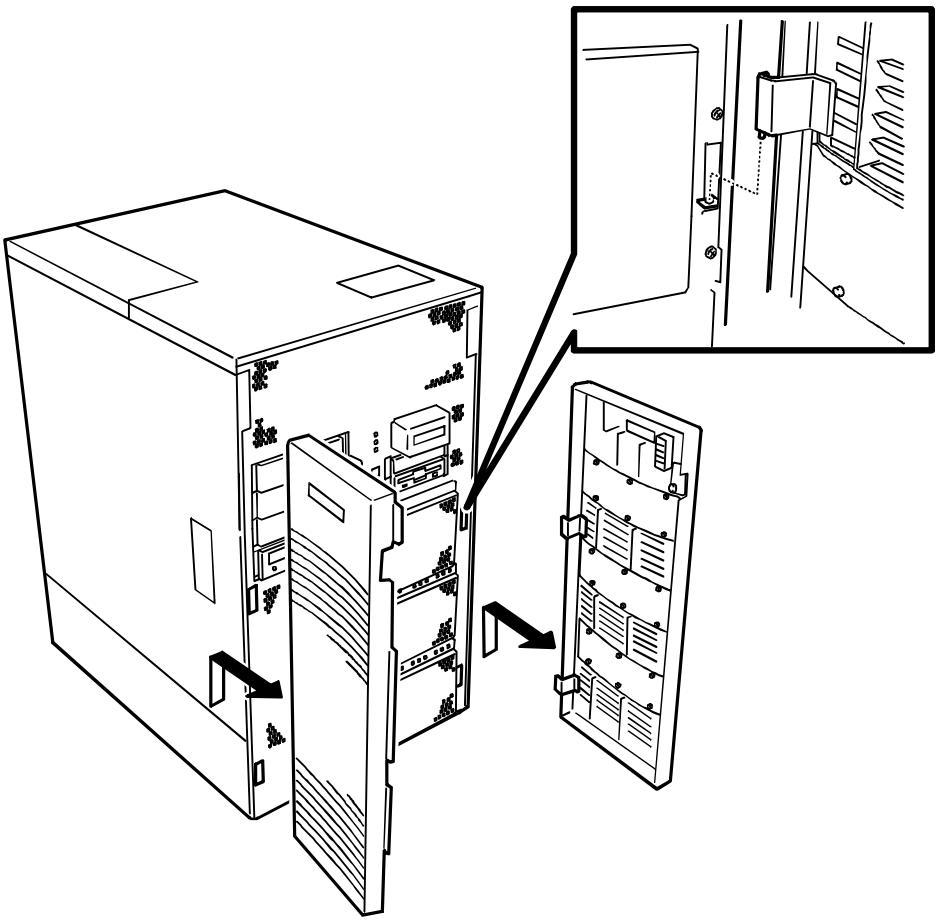


Figure 4-2. System Front Doors

Installing the Top Panel and Front Doors

Install the front doors and top panel as follows.

1. Position one of the front doors so the mounting pins of the front door are aligned with their mounting holes on the front of the system. Slide the lower mounting pin into its mounting hole and then slide in the upper pin.
2. Install the other front door in the same manner.
3. Position the top panel so that its mounting screw hole (A) aligns with the mounting hole on the front of the system (see Figure 4-1).
4. Secure the top panel with its mounting screw.

Removing the Top Cover and Side Panels

To install options in your system, you should do the following.

- To modify the system I/O board, add an option board, or add a removable media device, remove the top cover, top panel, front doors, and side panels.
- To add memory or a processor, remove the top panel, front doors, and right side panel.
- To install a hard disk cage, remove the top panel, front doors, and right side panel.

⚠ CAUTION

For proper cooling and airflow, do not operate the system with the top cover or side panels removed. Always replace them before powering on the system.

Do not damage or bend the EMI fingers that are located along the edges of the top cover and side panels, as you remove and install them, or your system may not meet EMI requirements.

⚠ WARNING

If you are removing the top cover or side panels after the system is set up, you must first power off the system and all external devices. **Unplug** the system power cords.

Remove the top cover or a side panel as follows.

1. Power off the system and ensure the power cords are unplugged from their AC wall outlet.
2. Observe the safety and ESD precautions listed at the beginning of this chapter.
3. The top cover and side panels are secured from the front edge with two thumb lock screws. Loosen the thumbscrews (see Figure 4-3).

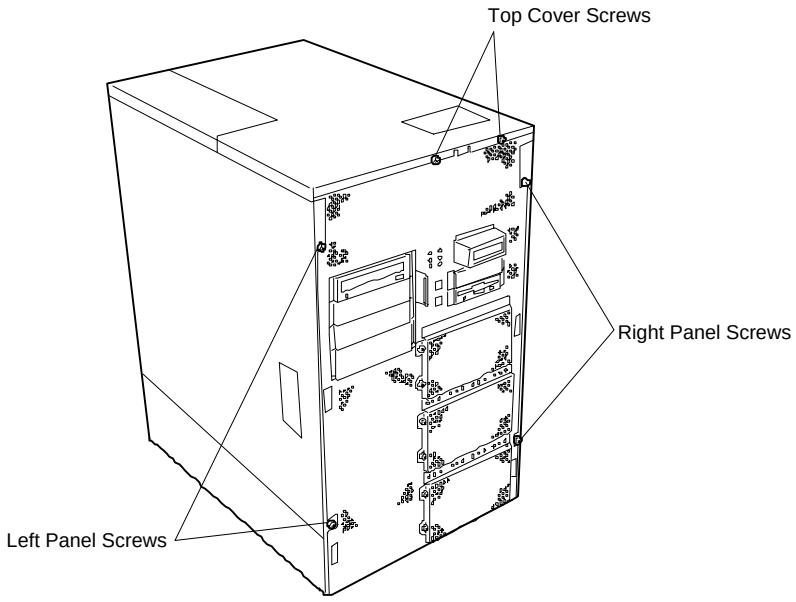


Figure 4-3. Mounting Screws for Top Cover and Side Panels

4. Slide the top cover or side panel toward the front of the chassis about an inch until it stops (see Figure 4-4).
5. Pull the top cover or side panel out and away from the chassis.
6. Set the cover or panel aside for reattaching later.

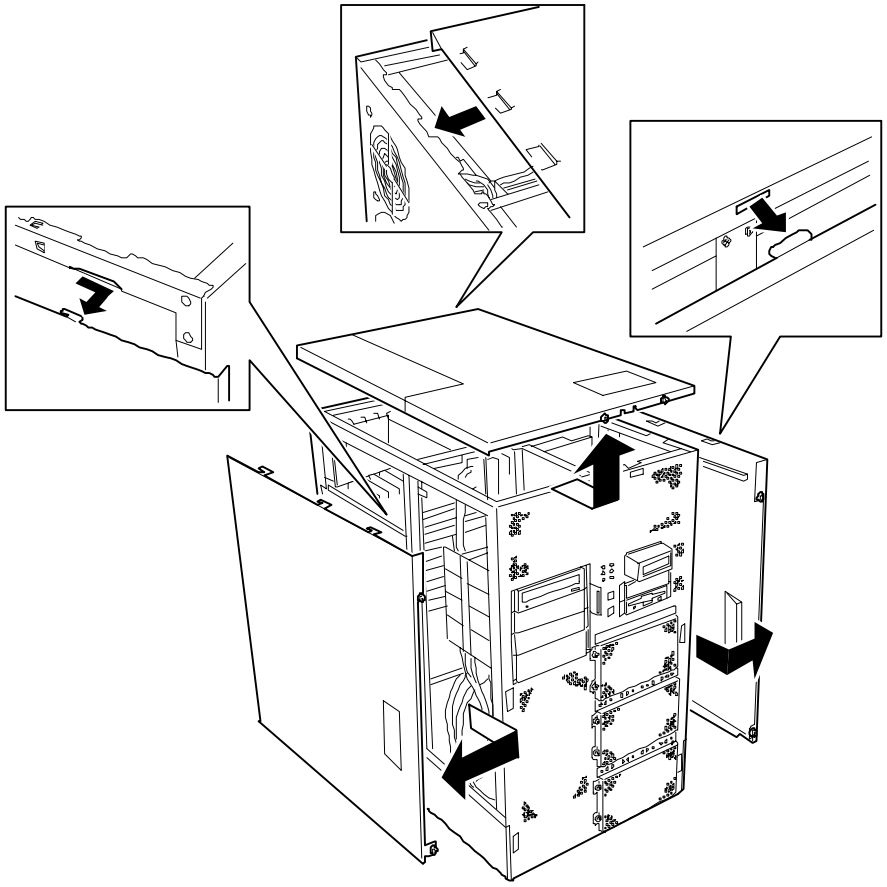


Figure 4-4. Top Cover and Side Panels Removal

Installing the Top Cover and Side Panels

Install the top cover and side panels as follows.

1. Before replacing the top cover or side panel, make sure no tools or loose parts have been left inside the system chassis.
2. Make sure all option boards are firmly seated in their respective slots and that all interior cables are properly connected.
3. The top cover and side panels have tabs that align with the slots in the chassis (see Figure 4-4). Align the tabs with the slots in the chassis and carefully push inward.
4. Slide the cover or panel toward the rear of the chassis so the tabs firmly engage in the slots.
5. Attach the cover or panel to the chassis by firmly tightening the two thumbscrews.

> ***Note:*** If your system is already set up, plug the system back in, reconnect the peripherals, and power on the peripherals and system.

Modifying the System I/O Board

The following subsections provide procedures for upgrading and configuring the system I/O board.

- Replacing the non-volatile memory
- Replacing the real-time clock battery.

> ***Note:*** Electrostatic discharge (ESD) can damage add-in boards and other components; place them on an antistatic surface. Wear an antistatic wrist strap attached to chassis ground.

Replacing the Non-Volatile Memory (NVRAM)

You may need to replace the non-volatile memory because of its internal integral lithium battery life span. Contact your sales representative or dealer for a list of approved devices. The NVRAM is located on your system I/O board (see Figure 4-5). Notice the dot on the chip. Use the dot to correctly position the chip on the system board.

> **⚠ CAUTION**
>
> Danger of explosion if the battery is incorrectly replaced. Replace only with same or equivalent type recommended by manufacturer. Dispose of lithium batteries as required by local ordinance or as normal waste if no local ordinance exists. Do not expose the component to excessive heat or fire. Keep all batteries away from children.

Replace the non-volatile memory as follows.

> ***Note:*** Observe static precautions. Use an antistatic wrist strap.

1. Power off the system and remove its left side panel as described earlier.
2. If the non-volatile memory is secured by a tie-wrap, remove the tie-wrap. Note the position of the dot on the NVRAM in relation to its socket. Using a IC removal tool or a small pointed tool, gently pry up each end of the non-volatile memory and pull it straight up out of its socket (see Figure 4-5).
3. Position the new chip over its socket so the dot is properly oriented. Carefully insert the chip into its socket connectors.
4. Press down on the chip until it is firmly seated in its socket.
5. Replace the side panel and turn on the system.
6. Run the BIOS Setup to restore proper configuration settings.

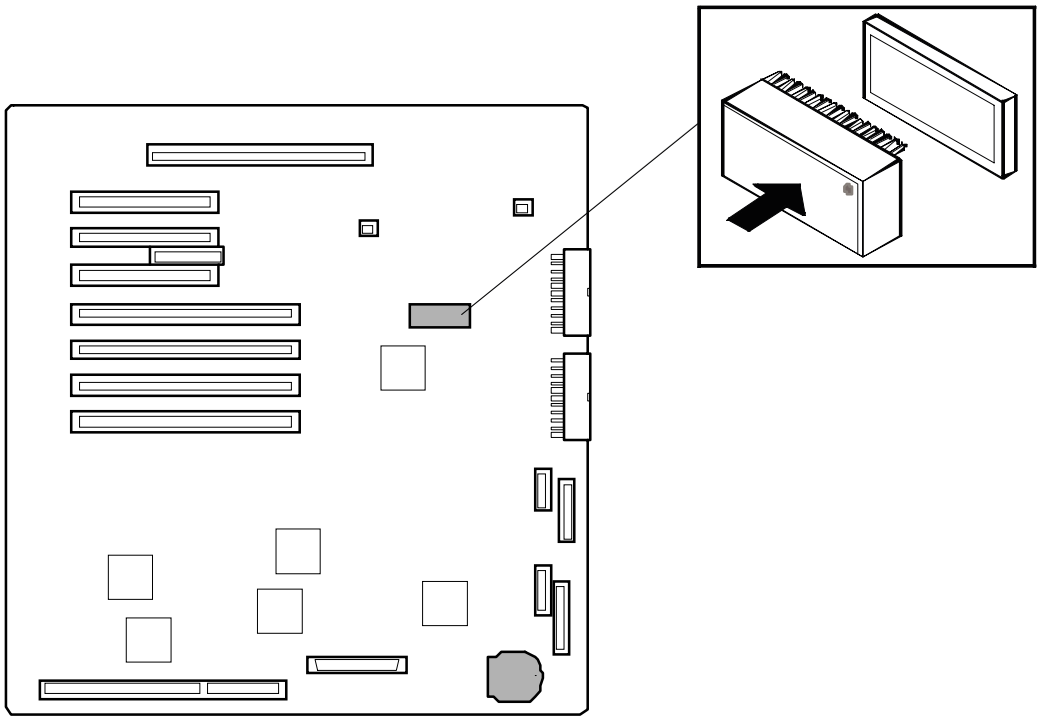


Figure 4-5. Non-Volatile Memory Location

Replacing the Real-time Clock Battery

You may need to replace the real-time clock (RTC) battery because of its battery life span. The battery powers the clock in the absence of power. When the battery starts to weaken, it loses voltage, and the system settings stored in CMOS RAM (for example, the date and time) may be wrong.

The battery (Vendor Part No. CR2450) is available through many vendors. It is located on your system I/O board (see Figure 4-6). Notice the plus (+) sign on the battery. The sign assists in correctly positioning the battery on the system board. Contact your sales representative or dealer for a list of approved devices.

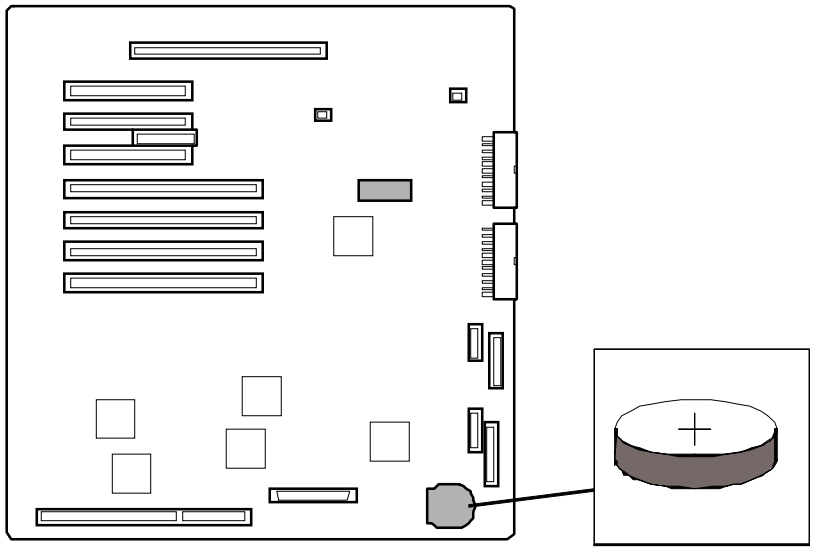


Figure 4-6. Location of the Real-Time Clock Battery

⚠ CAUTION

Danger of explosion if the battery is incorrectly replaced. Replace only with same or equivalent type recommended by manufacturer. Dispose of lithium batteries as required by local ordinance or as normal waste if no local ordinance exists. Do not expose the component to excessive heat or fire. Keep all batteries away from children.

Replace the battery as follows.

Note: Observe static precautions. Use an antistatic wrist strap.

1. Power off the system and remove the left side panel as described earlier.
2. If the battery has a protective plastic cover, remove the cover by lifting it away from the battery. Use your fingernail or a small pointed tool to gently push up the bottom edge of the battery. See Figure 4-6 for socket location.
3. Position the new battery over its socket with the plus (+) sign on the battery facing up.
4. Carefully insert the top of the battery into the socket connectors and gently push the battery into the socket until it is firmly seated in the socket.
5. Replace the top cover and turn on the system.
6. Run the BIOS Setup to restore configuration settings to the real-time-clock.

DIMMs

The memory board contains sixteen DIMM sockets arranged in four banks (see Figure 4-7). Each 168-pin socket can hold a single 72-bit DIMM module with 64MB, 128MB, or 256MB of memory. When all sixteen sockets are populated, the memory board supports a maximum of 4GB of memory with 256MB DIMMs. Your system supports a second memory board for a maximum system memory of 8GB. DIMMs must be identical within a bank on each board.

> ***Note***: DIMMs must be installed in a group (consisting of four DIMMs) that is designated as one memory bank. DIMMs must also be of the same type and capacity within a bank.

The first bank of DIMMs should be installed in sockets P01, P02, P03 and P04 (see Figure 4-7). When you install additional DIMMs, you must start with bank B and continue to bank D. When you remove DIMMs; you must start with the highest populated bank of DIMMs.

The following subsections describe the procedures for adding memory DIMMs to your system.

> **WARNING**
>
> If the system was running, any processor and heat sink installed is hot. To avoid the possibility of a burn while configuring memory, let the components cool for 10 minutes before continuing with the procedures described here.

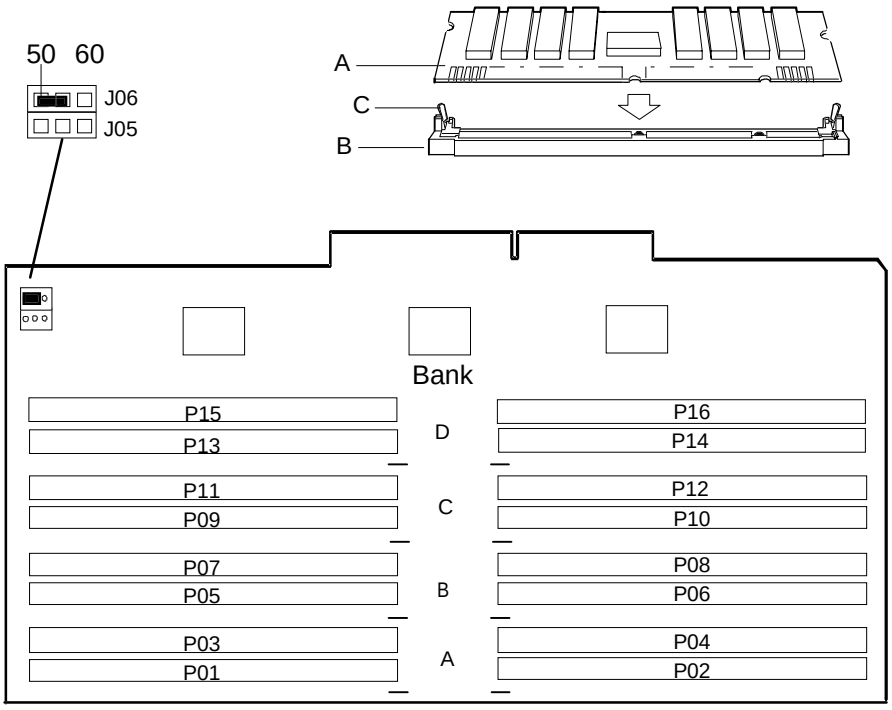


Figure 4-7. Inserting Memory DIMMs

Installing DIMMs

When properly installed, the DIMM module is oriented at an angle of 90 degrees relative to the memory board.

1. Power off the system and remove the right side panel as described earlier.

> ***Note:*** When you install DIMMS, you must start with the bottom memory board no.1 and continue to the top memory board no. 2.

2. Remove the metal bracket supporting the memory board (see Figure 4-8). The support bracket is secured to the chassis by two fasteners (A). Release each fastener by slowly pulling it towards you (listen for two clicks). Grasp the left side of the support bracket and swing it away from the chassis to remove it. Set the support bracket aside for later installation.

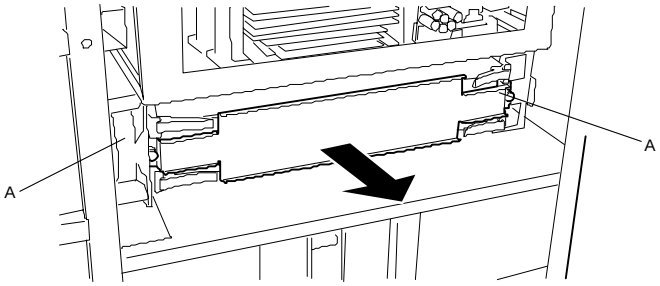


Figure 4-8. Memory Board Support Bracket

> ***Note:*** Observe static precautions. Use an antistatic wrist strap. Hold DIMMs only by their edges.

3. Open the ejectors on both sides of the memory board (see Figure 4-9). Holding the memory board by its edges, carefully pull it out until the edge connectors are free. Place the memory board on an antistatic surface.

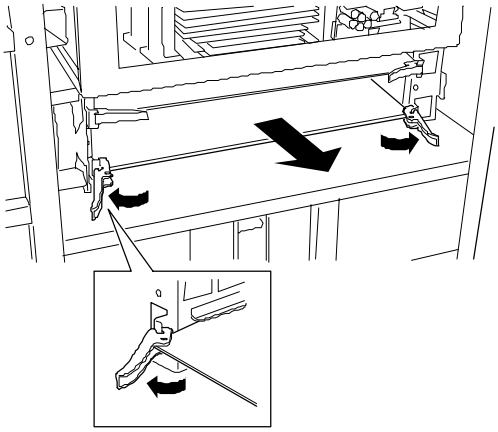


Figure 4-9. Memory Board Ejectors

4. Holding the DIMM module only by the edges, remove it from its antistatic package.

> ***Note:*** When installing DIMMs in empty DIMM connectors on the memory board, you must remove the DIMM connector cover first.

5. DIMMs are keyed so they can only be inserted one way. Position the DIMM over the socket on the board (see Figure 4-7, A and B). The notches in the bottom edge of the DIMM mate with the raised bumps in the DIMM socket.
6. Press down evenly on the DIMM until it seats correctly. The retaining levers (see Figure 4-7, C) on the sockets are not "tools" to aid in the insertion, only to keep the DIMMs in place and to aid in extraction. The levers should click in place once the DIMM is fully inserted.
7. Repeat the above steps to install any remaining DIMMs.
8. Ensure the memory board jumper is positioned on J06 as shown in Figure 4-7 (50ns).
9. Hold the memory board by its edges and start to insert it into the slot guides. On the baseboard, locate the memory board connector. Do not press in on the board yet! Ease board into the slot guides until it is just touching the connector on the baseboard.
10. Be sure the ejector levers are extended so they can engage the chassis frame. Press the board carefully but firmly into the baseboard connector to seat the board. Close the ejectors on both sides of the memory board. Be sure the ejector is firmly fastened in the chassis frame before closing the ejector.
11. Fasten the right side of the support bracket into the chassis frame and swing the support bracket into position so that the rear edge of the memory boards fits snug against the bracket. The support bracket is secured to the chassis by two fasteners. Push in on the support panel fasteners until they click in the locked position.
12. Replace the right side panel and turn on the system.
13. Run the BIOS Setup to confirm the DIMMs are installed correctly.

Removing DIMMs

Remove DIMMs from their sockets as follows.

1. Power off the system and remove the right side panel as described earlier in this chapter.
2. Remove the metal bracket supporting the memory board. The support bracket is secured to the chassis by a pin. Release the support bracket by pulling the two fasteners towards you (listen for two clicks). Grasp the left side of the support bracket and swing it away from the chassis to remove it. Set the support bracket aside for later installation.
3. Open the ejectors on both sides of the memory board (see Figure 4-9). Holding the memory board by its edges, carefully pull it out until the edge connectors are free. Place the memory board on an antistatic surface.

> ***Note:*** Use extreme care when removing a DIMM. Hold DIMMs only by their edges. Place them on an antistatic surface; do not slide them across any surface. Applying too much pressure can break the retaining clips or damage the socket slot. Apply only enough pressure on the retaining clips to release the DIMM.

4. Remove the DIMM modules one at a time starting from the highest numbered sockets.
5. To remove each DIMM, gently spread the retaining levers (see Figure 4-7, C) just enough so that you can pull the top edge of the DIMM away from the levers.
6. Carefully lift the DIMM away from the socket and store it in an antistatic package.
7. Repeat the above steps to remove the remaining DIMMs.
8. Hold the memory board by its edges and start to insert it into the slot guides. On the baseboard, locate the memory board connector. Do not press in on the board yet! Ease board into the slot guides until it is just touching the connector on the baseboard.
9. Be sure the ejector levers are extended so they can engage the chassis frame. Press the board carefully but firmly into the baseboard connector to seat the board. Close the ejectors on both sides of the memory board. Be sure the ejector is firmly fastened in the chassis frame before closing the ejector.
10. Fasten the right side of the support bracket into the chassis frame and swing the support bracket into position so that the rear edge of the memory boards fits snug against the bracket. The support bracket is secured to the chassis by two fasteners. Push in on the support bracket fasteners until each clicks in the locked position.
11. Replace the right side panel and turn on the system.

Processors

The following sections provide procedures for installing and removing the Pentium III Xeon Processor Single Edge Contact (S.E.C.) cartridge. Use these procedures when upgrading or replacing your processor(s). Each processor is packaged in a S.E.C. cartridge. The cartridge includes the processor core with an integrated 16 KB primary (L1) cache, secondary (L2) cache, heat sink, and a back cover. The processors are supported by one or more voltage regulator modules (VRM) on the CPU backboard, depending on the number of installed processors.

Each S.E.C. cartridge installs in a Slot 2 connector on the CPU backboard. Each slot must contain either a processor cartridge or a termination board (if there are less than four processors installed). The VRM modules are installed in a bank of VRM sockets adjacent to the processors.

Note: Your system may have up to four processors on a CPU backboard and up to eight processors if a second CPU backboard is installed. All installed processors must be matched for speed. If replacing a processor, the replacement processor must match the speed of all installed processors. If upgrading a processor, all processors must be upgraded to match.

CAUTION

Electrostatic discharge (ESD) can damage components; place them on an antistatic surface. Update the CPU baseboard using an antistatic wrist strap attached to chassis ground.

WARNING

If the system was running, any processor and heat sink installed is hot. To avoid the possibility of a burn, let the components cool for 10 minutes before continuing with these procedures.

Installing a Processor Cartridge

Use the following procedure to install a processor cartridge.

> ***Note:*** All systems ship with at least a processor cartridge installed in the bottom slot of a CPU backboard and termination boards in the remaining slots. Some systems may have more processors, depending on configuration. All processors must be matched in speed.

1. Power off the system and remove the right side panel as described earlier.
2. Remove the power cable from the CPU backboard (see Figure 4-10).

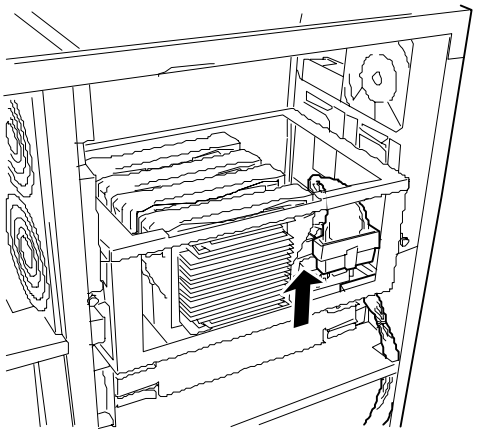


Figure 4-10. Removing the CPU Backboard Power Cable

3. Remove the two screws securing the terminator board and the CPU backboard (see Figure 4-11).

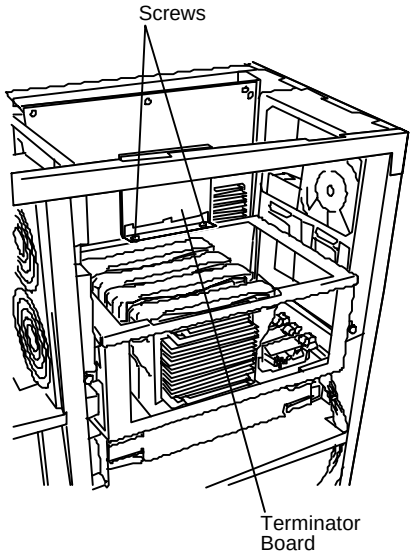


Figure 4-11. Removing the Terminator Board

4. Pull the fasteners on both sides of the CPU backboard to release the lock.
5. Hold the frame of the CPU backboard firmly and pull the board forward to remove it (see Figure 4-12).

> ***Note:*** The CPU backboard weighs approximately 12 1/2 pounds (5.7kg). Hold it firmly to remove it.

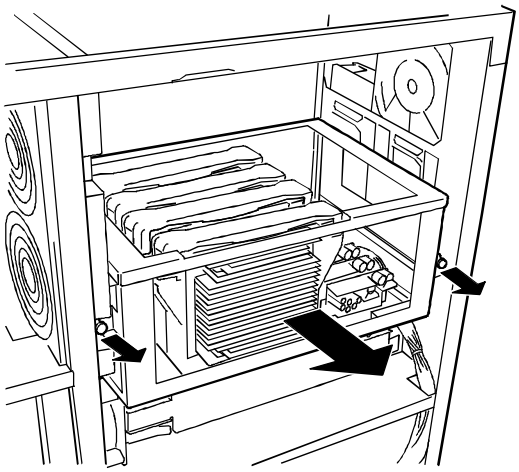


Figure 4-12. Removing the CPU Backboard

> ***Note:*** Observe static precautions. Use an antistatic wrist strap. Hold processors only by their edges.

6. Place the CPU backboard gently on a flat and clean surface.
7. Remove the retention arm locking the termination card in place by pressing in on the right side of the bar to release the arm (see Figure 4-13).
8. Pull the retention arm towards you to release the arm from the module (see Figure 4-13).

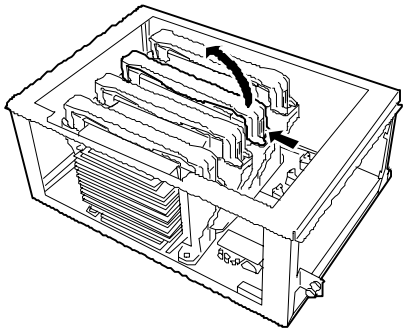


Figure 4-13. Removing the Retention Arm

- Open the two card ejectors (one on each side) and pull the card out of the system (see Figure 4-14).

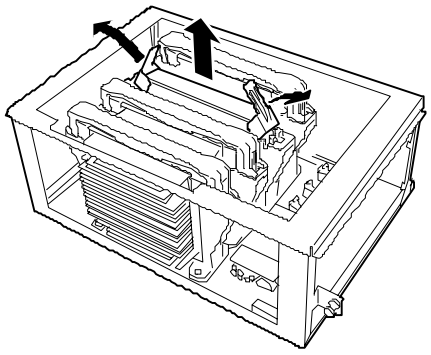


Figure 4-14. Removing the Termination Card

9. Remove a new processor cartridge from its antistatic package and place it on a grounded static-free surface or conductive foam pad.

If tabs are not attached to the cartridge, remove them from the termination card and install on the cartridge.

- Slightly spread open each tab so that the two pegs on the tab fit into two holes at the corner of the cartridge. Use care in opening the tab to prevent breakage.

10. Open the tabs on the cartridge and align the cartridge with the slot so that the heat sink faces down (see Figure 4-15).

If installing a termination card, align the card so that the embossed logo on the card faces up.

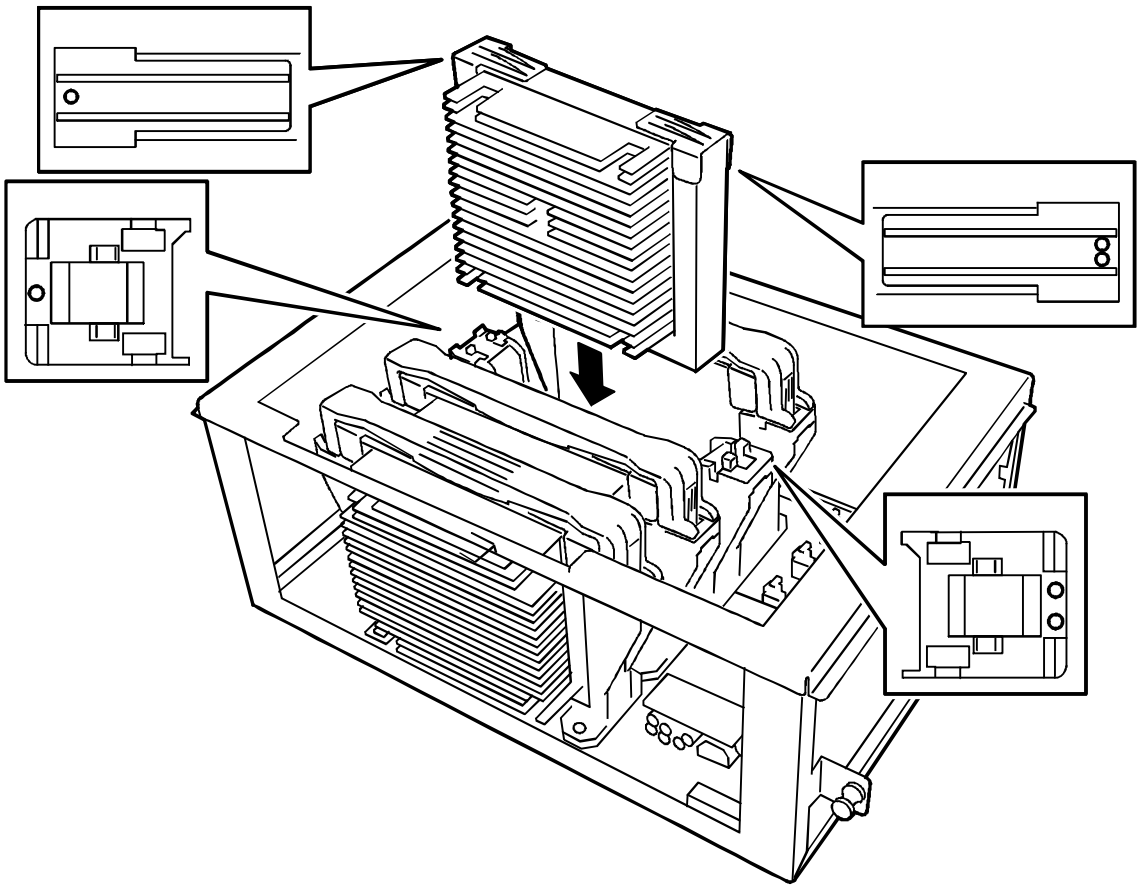


Figure 4-15. Aligning the Cartridge

11. Insert the cartridge into the guide rails of the retention module (see Figure 4-16) and carefully push into the module until resistance is felt. Check that it is firmly seated (tabs should be closed).

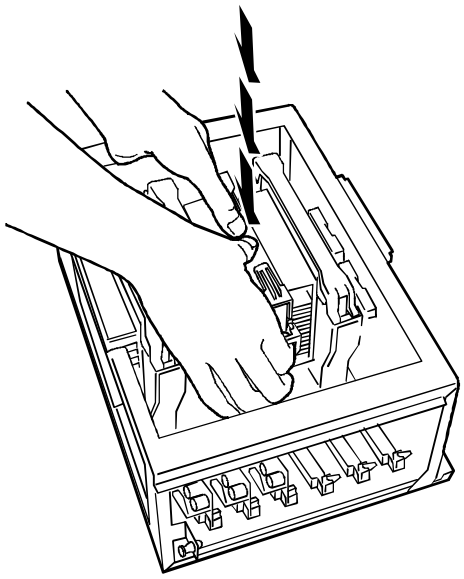


Figure 4-16. Installing the Processor

12. Reattach the retention arm as follows.

- Align the end of the retention arm with a single alignment dot to the left and the end with the two dots to the right. The dots should match corresponding dots on the cartridge or terminator board.
- Push the left end of the retention arm into its slot on the on the left side of the retention module.
- Turn the retention arm to the right and snap it into place on the right side of the retention module.

13. Install the required VRM modules (single processor systems come with two VRM modules installed in VRM sockets 1 and 2). As you add processors, you need to install additional VRM modules.

- For a second processor, install a VRM module in socket 3 (for a total of three VRM modules for two processors).
- For a third processor, install a VRM module in sockets 4 and 5 (for a total of five VRM modules for three processors).
- For a fourth processor, install a VRM module in socket 6 (for a total of six VRM modules for four processors).

14. Hold the CPU backboard firmly and mount it in the server (see Figure 4-17).

- Align both right and left frames of the CPU backboard with the guide rails in the server.

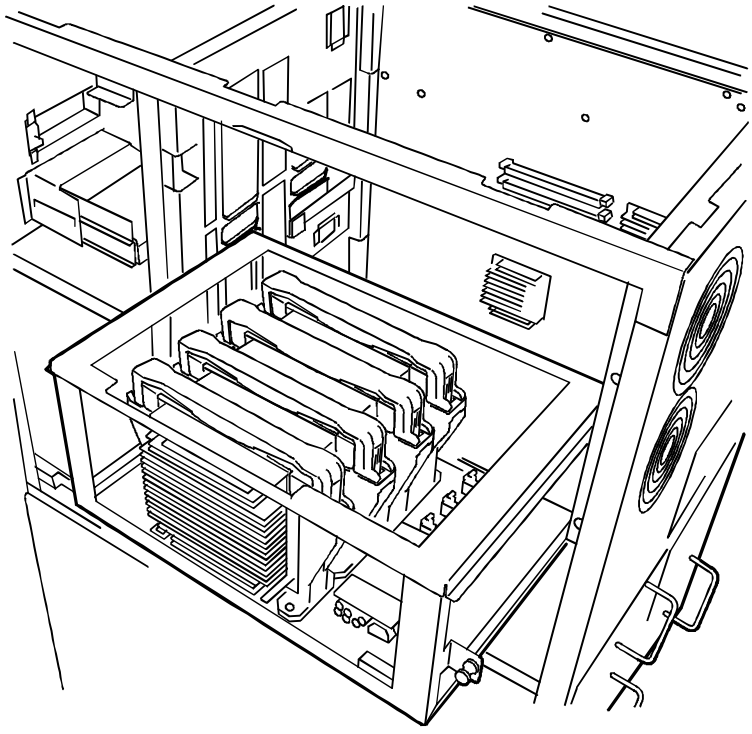


Figure 4-17. Installing the CPU Backboard

15. Push on the right and left marks (circles) on the CPU backboard frame slowly. The CPU backboard is connected with the baseboard inside the server.

⚠ CAUTION

Pushing on portions other than the marks on the CPU backboard may bend its frame.

16. Press the fasteners on the right and left ends of the CPU backboard to secure.

17. Connect the power cable (see Figure 4-18).

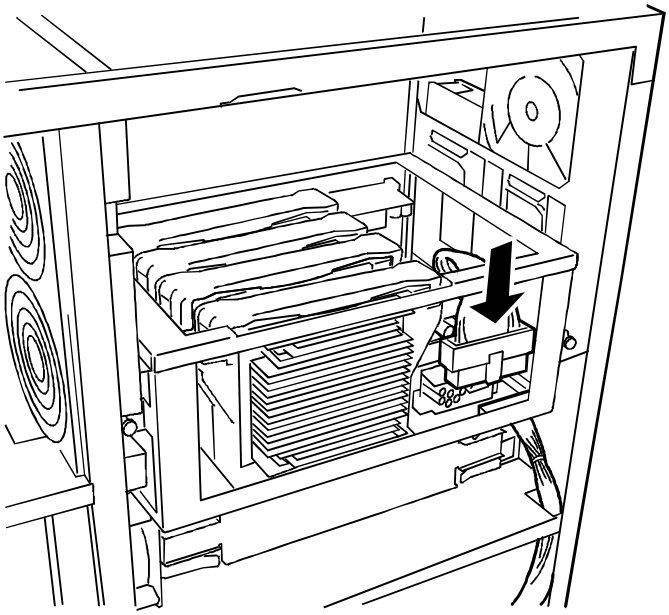


Figure 4-18. Connecting the CPU Backboard Power Cable

18. Secure the terminator board and the CPU backboard with the screws removed in step 3.

19. Replace the right side panel and turn on the system.

20. After you have installed a new processor, run the BIOS Setup Utility to configure its speed.

Removing a Processor Cartridge or Termination Board

Use the following procedure to remove a processor cartridge or termination board.

1. Perform steps 1 through 6 of the previous subsection "Installing a Processor Cartridge."

> ***Note:*** Observe static precautions. Use an antistatic wrist strap. Hold processors only by their edges.

2. On the processor or termination card being removed, push in the right end of the retention arm to release the arm.
3. Pull the retention arm toward you and remove the arm (see Figure 4-13).
4. Open the two card ejectors (one on each side) and pull the cartridge or termination board straight out to disengage the cartridge or board from the CPU baseboard (see Figure 4-14).
5. Pull the cartridge or termination board straight out of the retention module. Place on a grounded, static-free surface or conductive foam pad.
6. Put the old cartridge in conductive foam and store in an antistatic package.
7. Install a new processor cartridge or termination card (see “Installing a Processor Cartridge”). If not installing a processor, install a termination card the same way as a cartridge and remove the appropriate VRM module(s).

Optional CPU Backboard

The following sections provide the procedures for installing the optional CPU backboard. Use these procedures when upgrading to more than four processors.

Processors 1 through 4 are installed on the standard CPU backboard. Processors 5 through 8 are installed on the optional CPU backboard.

To install the optional CPU backboard, perform the following procedures.

1. Power off the system and remove the right side panel as described earlier.
2. Place the optional CPU backboard on a flat clean surface.
3. Perform steps 7 through 13 of the previous subsection "Installing a Processor Cartridge."
4. Remove the power cable from the terminator board mounted on the baseboard.
5. Remove the two screws securing the terminator board and remove the terminator board. (see Figure 4-19).

> ***Note:*** Store the terminator board for future use.

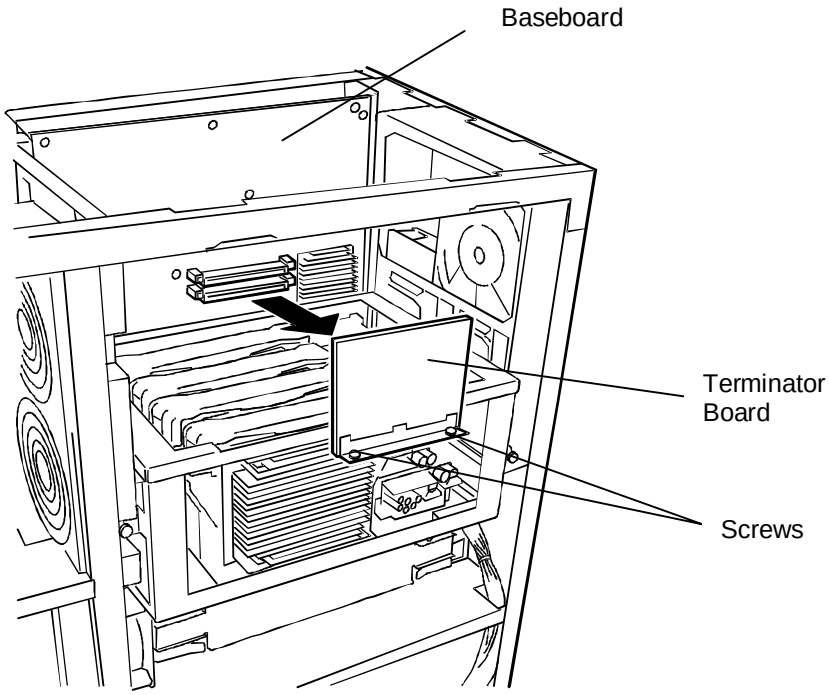


Figure 4-19. Removing the Terminator Board

6. Hold the optional CPU backboard firmly and mount it in the server (see Figure 4-20).

- Align both right and left frames of the CPU backboard with the guide rails in the server.

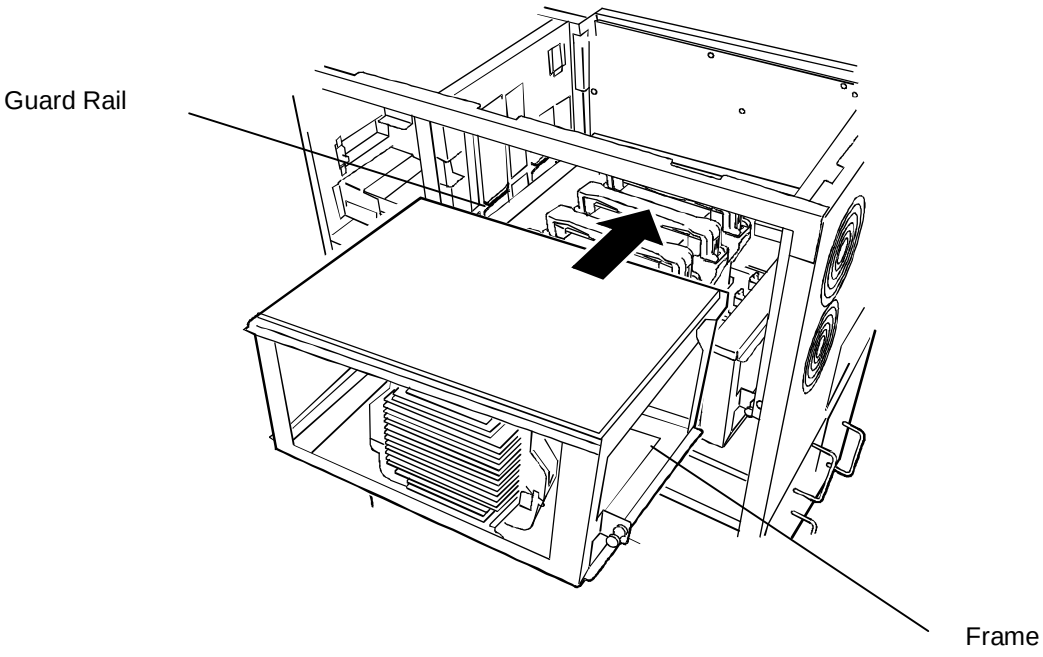


Figure 4-20. Mounting the Optional CPU Backboard

7. Push on the right and left marks (circles) on the CPU backboard frame slowly (see Figure 4-21). The CPU backboard is connected with the baseboard inside the server.

⚠ CAUTION

Pushing on portions other than the marks on the CPU backboard may bend its frame.

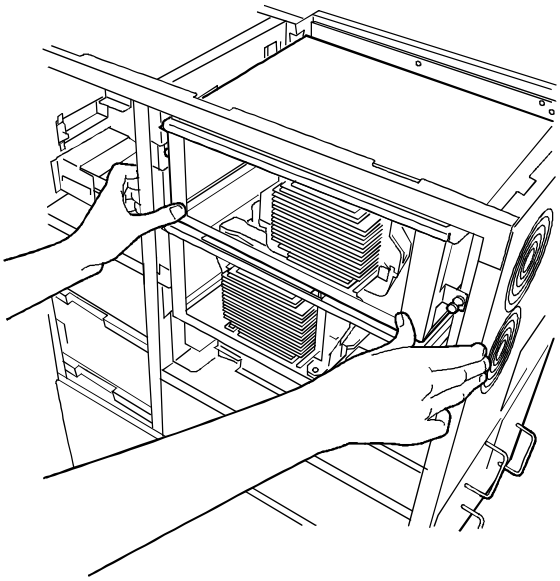


Figure 4-21. Installing the Optional CPU Backboard

8. Press the fasteners on the right and left ends of the CPU backboard to secure.
9. Connect the power cable (see Figure 4-22).

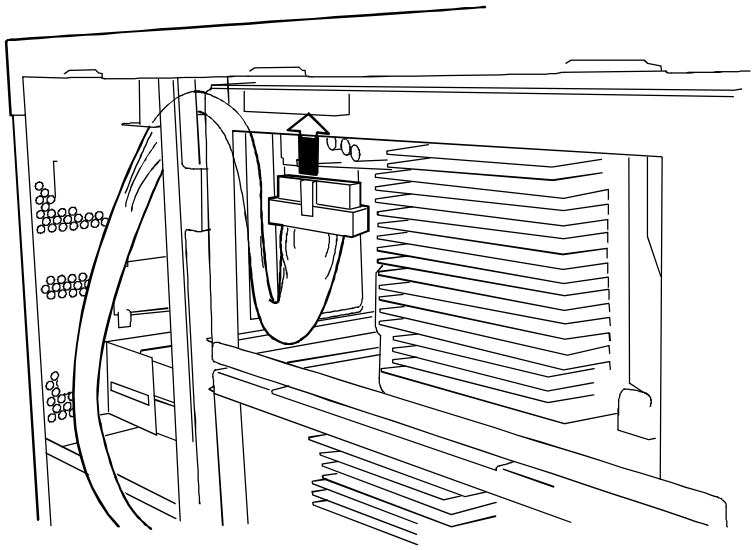


Figure 4-22. Connecting the CPU Backboard Power Cable

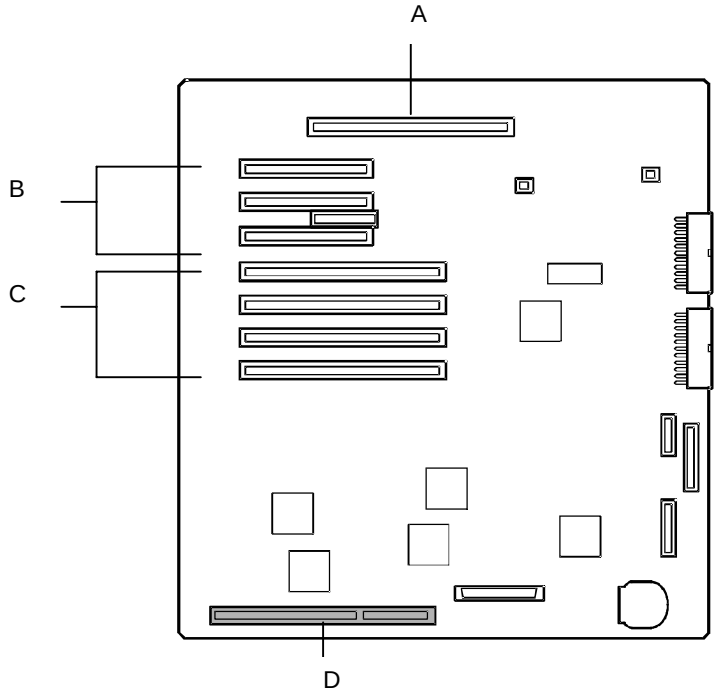
10. Replace the right side panel and turn on the system.

11. After you have installed a new processor, run the BIOS Setup Utility to configure its speed.

Option Boards

The following sections describe how to install and remove ISA and PCI option boards. The system I/O board has four dedicated 64-bit PCI bus expansion slots, three dedicated 32-bit PCI expansion slots, one dedicated Hot Plug PCI bus board for an additional four 32-bit hot-swappable PCI slots, and one ISA expansion slot (see Figures 4-23 and 4-24.

The high-performance PCI local bus allows the adoption of newer networking technology, such as 100 Mega-bit/second Ethernet NICs, with a minimum of effort and without concern for I/O bottlenecks. The PCI local bus offers up to 133 Mega-byte/second bandwidth.



A Hot Plug PCI board connector. Board contains four second PCI board slots (32-bit) (PCI #21, PCI #22, PCI #23, and PCI #24, see Figure 4-20).

B First PCI Board Slots (32-bit) (PCI #11, PCI #12, and PCI#13 from the bottom).

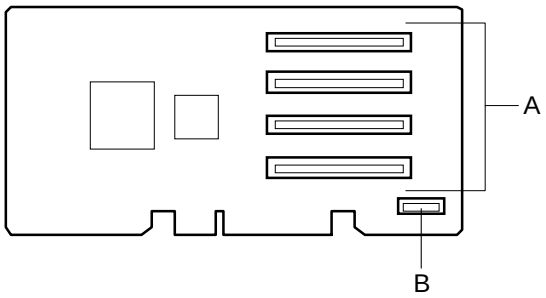
C Third PCI Board Slots (64-bit) (PCI #31, PCI #32, PCI #33 and PCI #34 from the bottom).

The first disk array controller must be mounted in PCI #32.

D ISA Board Slot.

Figure 4-23. PCI and ISA Slot Locations

The Hot Plug PCI board with four second PCI board slots is shown in Figure 4-24.



A Second PCI board slots (32-bit) (PCI #21, PCI #22, PCI #23, and PCI #24 from bottom).

Figure 4-24. Hot Plug PCI Board

Installation Considerations

Newer adapters, designed for Plug-and-Play systems, are automatically configured by the system without any user intervention. Older ISA adapters must be manually configured as detailed below. Once the manual configuration is complete, the Plug-and-Play adapters are configured around the manually configured adapters without causing any resource conflicts.

ISA adapters can be Plug-and-Play. ISA adapters that are not Plug-and-Play must be manually configured following the instructions supplied with the board. The configuration is defined to the system by setting the appropriate values via the BIOS Setup Utility.

Installing an Option Board

Install an option board as follows.

1. Power off the system and remove the top panel and left side panel as described earlier in this chapter.

   > ***Note:*** Observe static precautions. Use an antistatic wrist strap.

2. Remove the option board from its protective wrapper, holding the board only by the edges. Do not touch the board components or the gold connectors.
3. Record the option board serial number in the equipment log.
4. Set any board jumpers or switches as described in the documentation that comes with the option board.

   > ***Note:*** Refer to the documentation accompanying the option board for information on whether the board is to be installed in a PCI or ISA expansion slot.

5. See Figure 4-22 to determine system board slot locations.
6. Determine the expansion slot cover that corresponds to the desired expansion slot. Release the cover lock by pressing on the cover tab and remove the expansion slot cover (see Figure 4-25).

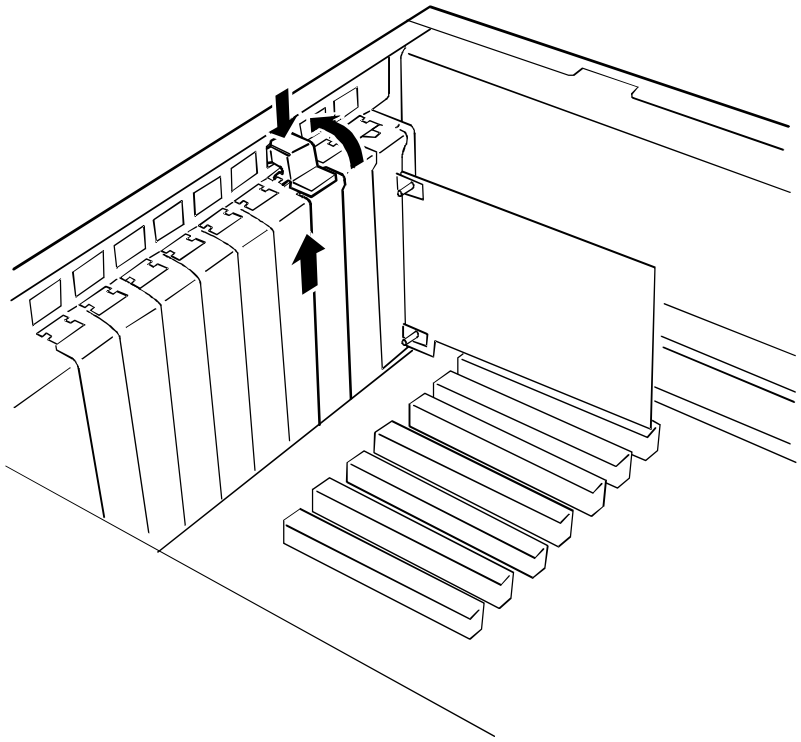


Figure 4-25. Removing the Expansion Slot Cover

7. Holding the board by its top edge or upper corners, firmly press the board into an expansion slot on the system I/O board. The tapered foot of the option board retaining bracket must fit into the mating slot in the expansion slot frame.
8. The retaining bracket fits into the space that was occupied by the expansion slot cover. Secure the expansion board by pushing down on the cover tab (see Figure 4-26).
9. If you installed a SCSI host adapter board, go to Appendix A, "Cabling," for procedures on cabling these boards into the system. For all other boards, continue with step 12.

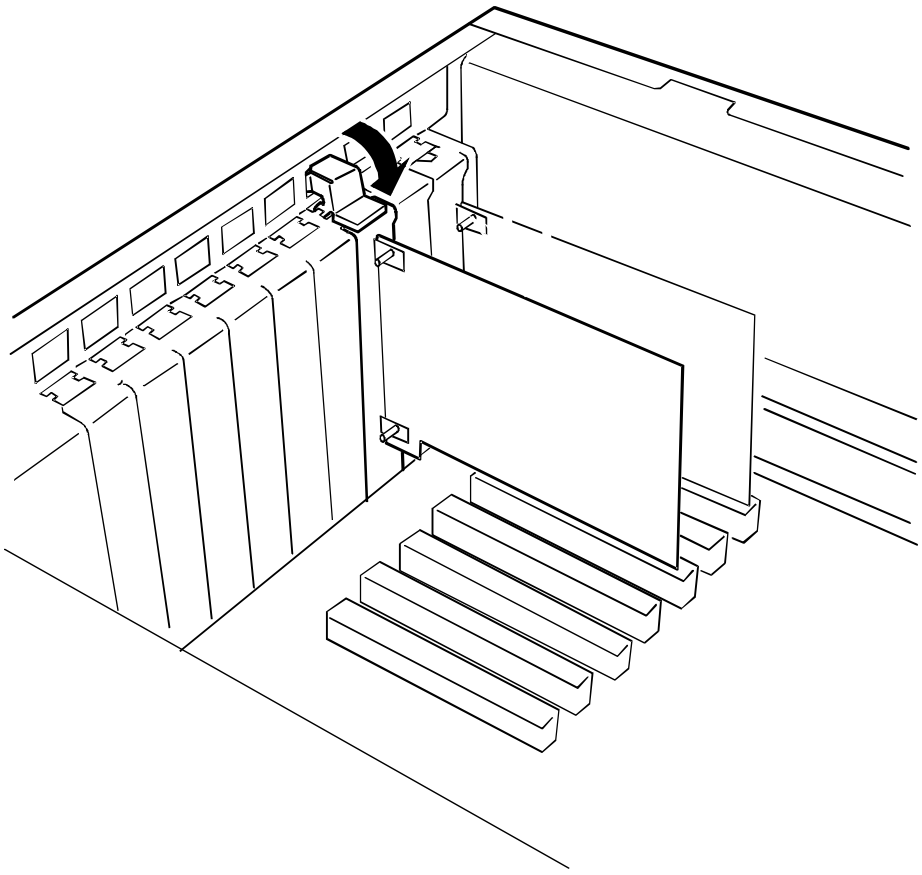


Figure 4-26. Installing an Option Board

10. Connect any external cables (if they are needed) to the installed option board.
11. Replace the top panel, left side panel, and power on the system.

Removing an Option Board

> ***Note:*** Expansion slot covers must be installed on all vacant slots to maintain the electromagnetic emissions characteristics of the system and to assure proper cooling of the system components.

1. Power off the system and remove the top panel and left side panel as described earlier.
2. Unplug any cables attached to the option board you are removing.
3. Determine the expansion slot retaining bracket that corresponds to desired expansion slot and release the retaining bracket lock by pressing on its tab (see Figure 4-25).
4. Hold the board at each end, and carefully rock it back and forth until the edge connectors pull free. Make sure that you do not scrape the board against other components.
5. Remove the board from the expansion slot and place it in an antistatic wrapper.
6. If you are replacing a board, go to "Installing an Option Board," otherwise continue.
7. Install an expansion slot cover over the vacant slot. Secure the cover by pushing down on the cover tab (see Figure 4-26).
8. Replace the top and left side panels and power on the system.
9. If you removed a non-Plug-and-Play ISA option board, run BIOS Setup. Remove the ISA board configuration.

Power Supply

The following sections provide procedures for installing a power supply, removing a power supply, or swapping out a faulty power supply.

Installing a Power Supply

Use this procedure to install a power supply into your system.

1. Power off the system.
2. Slide the power supply into the chassis and tighten the thumbscrews (see Figure 4-27, A) that secures the power supply.
3. Connect the power cord to the AC wall outlet and to the input receptacle on the rear of the new power supply.
4. Power on the system.

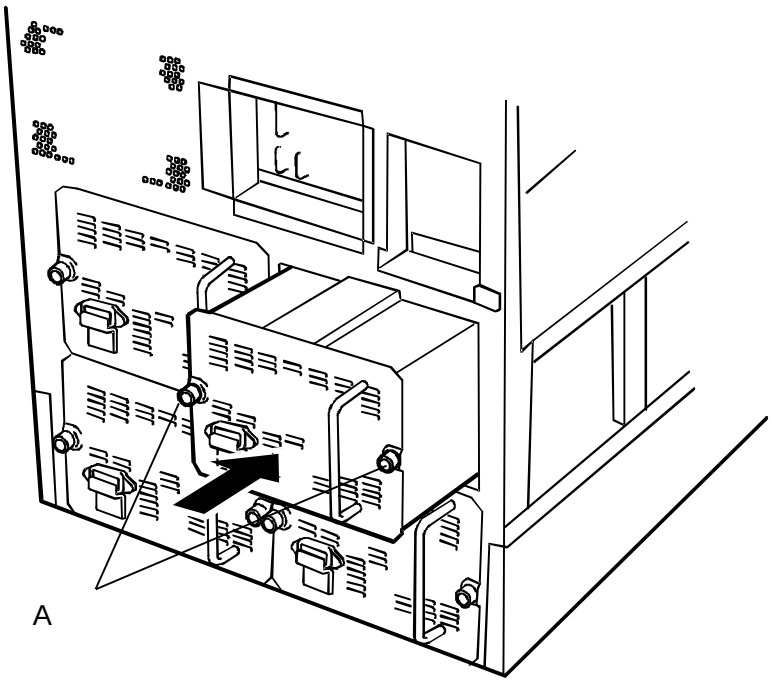


Figure 4-27. Power Supply

Removing a Power Supply

If the LED indicators on a power supply are lit, it's recommended that power to the system be turned off before removing the power supply. To remove a power supply, perform the following steps.

1. Power off the system.
2. Unplug the power cord from the AC wall outlet and from the input receptacle on the rear of the power supply you are removing.
3. Loosen the thumb lock screws (see Figure 4-27, A) that secure the power supply.
4. Hold the handle on the power supply and pull the power supply out of the system.
5. If you are replacing a power supply, go to "Installing a Power Supply," otherwise power on the system.

Hot-Swapping a Power Supply

If you are swapping out a faulty power supply, you can determine which one to remove by checking the status LED indicators on each supply. If either or both of the LED indicators are off, the power supply can be hot-swapped.

If the LED indicators on a power supply are lit, it's recommended that power to the system be turned off before removing the power supply. To remove a power supply, perform the following steps.

1. Unplug the power cord from the AC wall outlet and from the input receptacle on the rear of the power supply.
2. Loosen the thumb lock screws (see Figure 4-27, A) that secure the power supply you want to replace.
3. Hold the handle on the power supply and pull the power supply out of the system.
4. Slide the replacement power supply into the chassis and tighten the thumbscrews (see Figure 4-27, A) that secure the power supply.
5. Connect the power cord to the AC wall outlet and to the input receptacle on the rear of the new power supply.

Removable Media Devices

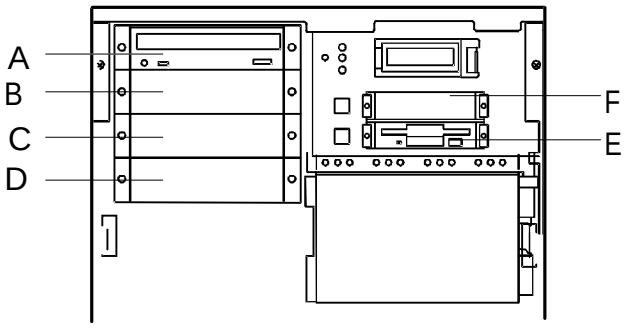
A CD-ROM drive is always mounted in bay D. Any SCSI removable media device can be installed in peripheral bays A, B, and C. The SCSI devices should be installed in the first available bay from the bottom (bay D).

Figure 4-28 illustrates the recommended removable media configuration. The bays are intended to hold tape, CD-ROM, or other removable media drives. Narrow SCSI drives in the 5 1/4-inch bays receive control signals from channel B of the SCSI-2 controller on the system I/O board.

> ***Note:*** The SCSI termination resistors must be installed in the last SCSI drive of the daisy chain cabling (bottom media bay D). All other devices must have terminators removed.

Hard disk drives cannot be installed in a 5 1/4-inch external bay because the drive generates EMI, is more susceptible to ESD, and does not have sufficient cooling.

A 1.44 MB diskette drive is always mounted in bay E. A second 3 1/2-inch device can be installed in bay F.



Removable Media Device Bays

A. CD-ROM drive

B. 5 1/4-inch expansion bay

C. 5 1/4-inch expansion bay

D. 5 1/4-inch expansion bay

E. 1.44 MB diskette

F. 3 1/2-inch expansion bay

Bay A SCSI CD-ROM (always installed). Device will have the internal SCSI terminators **installed**.
BAY B Second SCSI CD-ROM. SCSI QIC Tape. SCSI DAT Tape. Device must have the internal SCSI terminators **removed**.
Bay C SCSI QIC Tape. SCSI DAT Tape. Device must have the internal SCSI terminators **removed**.
Bay D SCSI QIC Tape. SCSI DAT Tape. Device must have the internal SCSI terminators **removed**.
Bay E 1.44 MB diskette drive (always installed).
Bay F Second 3 1/2-inch device.

Figure 4-28. Removable Media Device Bays

Installing a 5 1/4-Inch Device or 3 1/2-Inch Diskette Drive

Install a 5 1/4-inch device or 3 1/2-inch diskette drive as follows.

⚠ CAUTION

CD-ROM devices contain a laser system and are classified as CLASS 1 LASER PRODUCTS. In case of any trouble with a CD-ROM, please contact your nearest service representative. To prevent direct exposure to the laser beam, do not try to open the enclosure.

Use of controls or adjustments or performance of procedures other than those recommended by the manufacturer may result in hazardous radiation exposure.

Note: If you are replacing a diskette drive in Bay F or installing a diskette drive in bay E, use the internal diskette drive cables provided with the system. If you are installing a SCSI device in bays A, B, or C, you must use the internal SCSI cables. Contact your sales representative or dealer for a list of approved optional peripheral devices.

1. Power off the system. Remove the top panel, left front door, and the left side panel as described earlier.
2. Each empty media or diskette drive bay has a blank panel tray. From the bay where you want to install a drive, remove the two screws securing the blank panel tray to the chassis (see Figure 4-29).

   Note: When installing a full height 5 1/4-inch device, remove two blank panels.

3. Grasp the blank panel tray and slide it out of the bay.
4. Remove the two screws securing each side rail to the blank panel tray (see Figure 4-30).
5. Save the blank panel tray and screws to reuse if you remove a drive from a bay later and do not reinstall one.

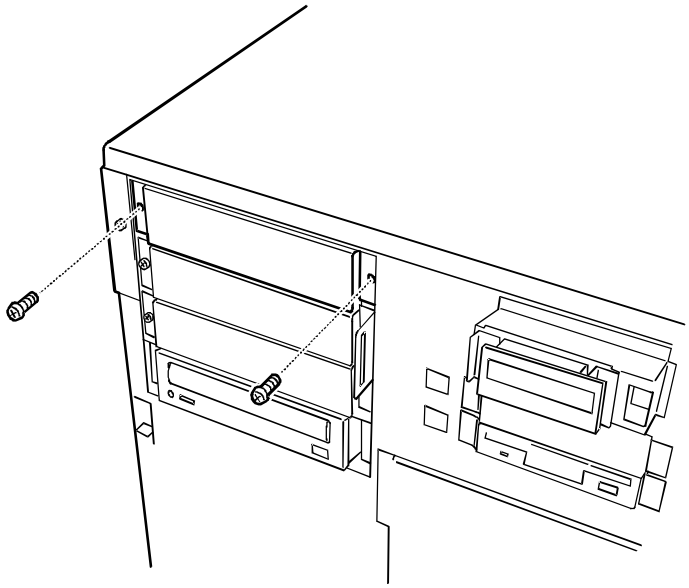


Figure 4-29. Removing Blank Panel Tray

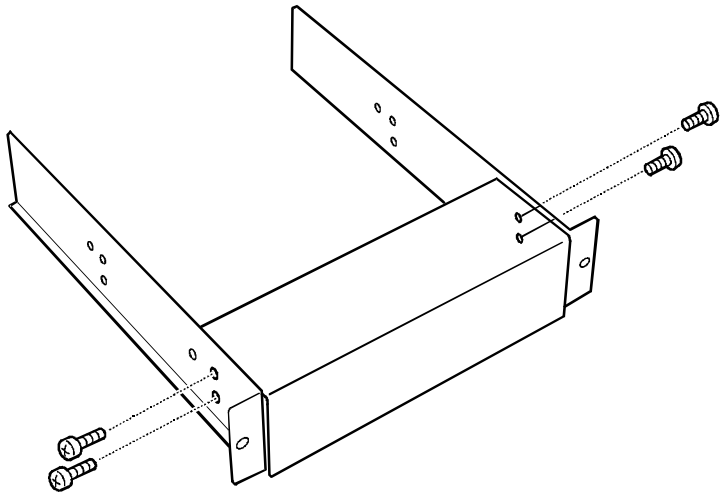


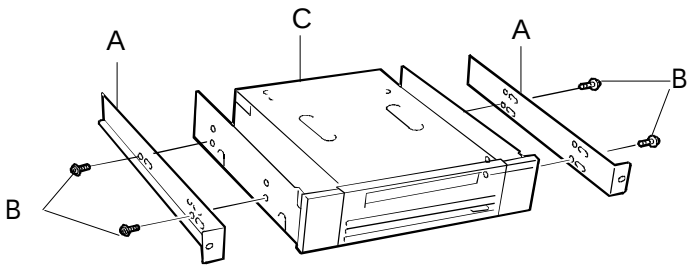
Figure 4-30. Removing Side Rails

6. Remove the device from its protective wrapper and place it on an antistatic surface. Record the drive model and serial number in the equipment log.
7. Set any device jumpers or switches on the device. Refer to the installation procedures that come with the device.

> ***Note:*** SCSI termination resistors for the 5 1/4-inch devices must be installed in the last SCSI device of the daisy chain cabling (bottom media bay D). All other 5 1/4-inch devices must have terminators removed.

8. Using the four screws supplied with the drive, reinstall the side rails just removed from the blank panel tray (see Figure 4-31, A). The rails for each side of the device are identical.

> ***Note:*** Do not use the screws used to secure the blank panel tray.



Attaching side rails to removable media drive

A Side rails

B Four drive mounting screws

C Drive

Figure 4-31. Attaching Side Rails to a Device

9. Engage the device side rails into the bay guide rails (see Figure 4-32). Ensure that the device side rails (see Figure 4-33, A) are inside the bay guide rails exactly as shown in Figure 4-33, B.

10. Push the drive into the bay until the screw holes of the side rails are directly in front of the chassis screw holes and secure with the screws previously removed.

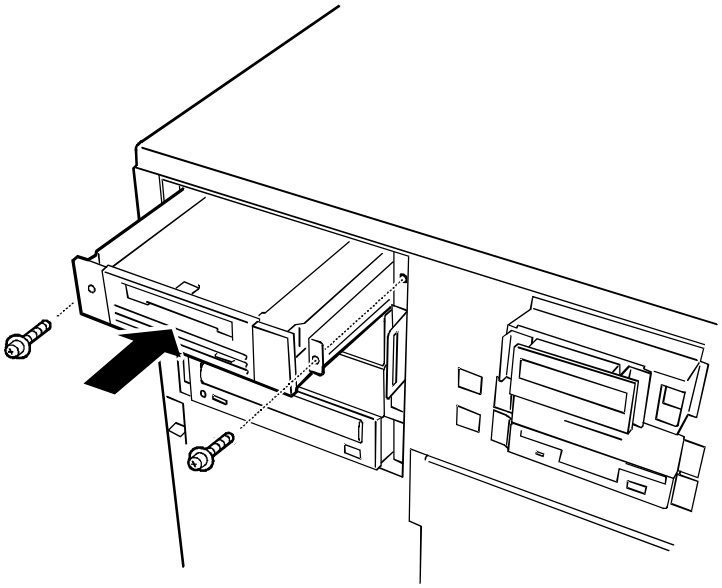


Figure 4-32. Installing Device

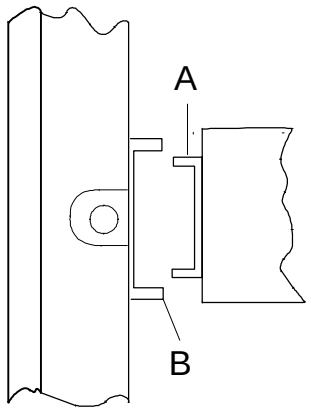


Figure 4-33. Engaging the Device Side Rails to the Bay Guide Rails

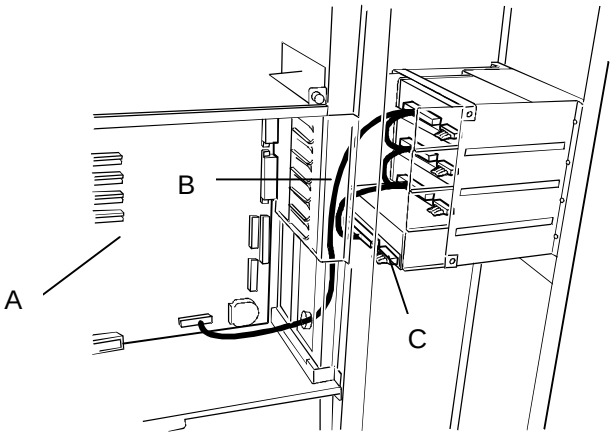
11. Connect a power cable to the back of the drive (see Figure 4-34).

> ***Note:*** For 5 1/4-inch devices, power cables are provided in the chassis for removable 5 1/4-inch media drives (including the CD-ROM that is factory-installed). These power cables are interchangeable for 5 1/4-inch devices only; you can connect any one of them to any device you install in the 5 1/4-inch media bays. The connectors are keyed and can be inserted in only one way.
>
> For 3 1/2-inch diskette drives power cables are provided in the chassis (including the diskette drive that is factory-installed). The connectors are keyed and can be inserted in only one way.

12. Connect the data cable (see Figure 4-34) to the device; the connector is keyed and can be inserted only one way.

> ***Note:*** For the 5 1/4-inch devices, be certain that you are using the 50-pin SCSI data cable. This cable comes from the system I/O board to the removable media bays and ends at the CD-ROM drive in bay D. Do not confuse this cable with the 34-pin diskette drive cable which begins on the system I/O board and ends at the diskette drive in bay F.

13. Reinstall the top panel, left front door, and the left side panel. Power on the system.



A System I/O board

B Data cable

C Power able

Figure 4-34. Installing Device Cables

Removing a 5 1/4-Inch Device or 3 1/2-Inch Diskette Drive

Remove a 5 1/4-inch device or a 3 1/2-inch diskette drive as follows.

1. Power off the system. Remove the top panel, left front door, and the left side panel as described earlier in this chapter.
2. Disconnect the signal and power cables from the back of the drive (see Figure 4-34).
3. Remove the two screws securing the device to the front of the chassis (see Figure 4-32).
4. Slide the drive out the front of the bay, and place on an antistatic surface.
5. Remove and save the side rails and screws (see Figure 4-31).
6. Place the drive in an antistatic wrapper.
7. Cover an empty bay by installing a blank panel tray in the bay (see Figure 4-29).
8. Reinstall the top panel, left front door, and the left side panel. Power on the system.
9. Remove the drive serial number from the equipment log.

Hard Disk Drives

The following sections provide procedures for installing an additional disk drive, removing a disk drive, or swapping out a faulty disk drive from one of the three hot-swap drive cages. The 3 1/2-inch SCSI drives must use the industry standard 80-pin Single Connector Attachment (SCA) connector. Each drive must be installed in a carrier.

Note: To order a carrier, contact your sales representative or dealer.

- If installing new drives, follow an installation scheme starting with the bottom left drive. Fill the cages left to right.
- If an individual SCSI drive fault LED (yellow light) is on steadily, this indicates that the drive below it has been flagged as faulty. Follow the procedure described in this section to remove the faulty drive and swap in a good one.

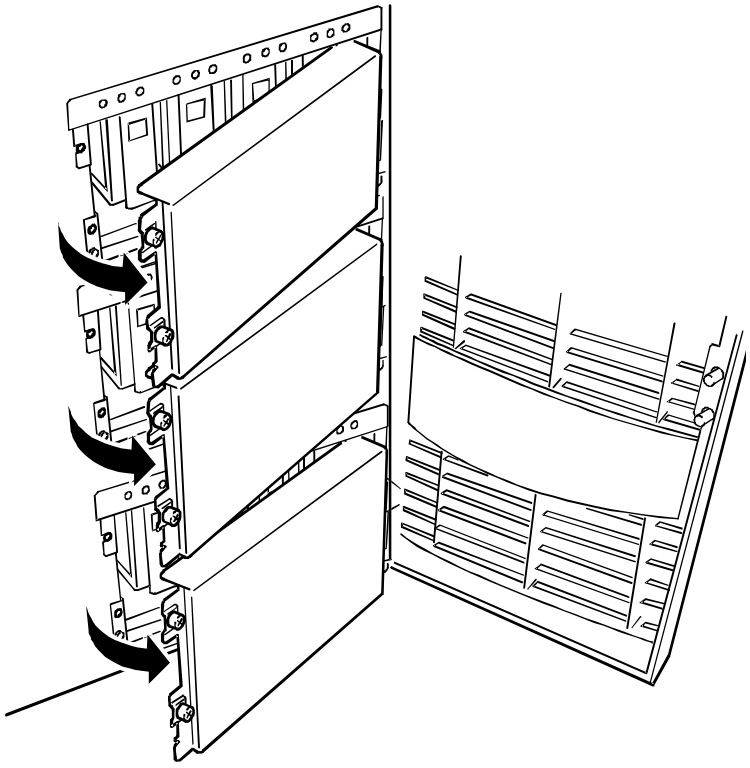
Note: **Swap SCSI drives without turning off power.** This is one of the few system procedures that is safe to do with the system power left on. This is true only if a Redundant Array of Independent Disks (RAID) controller module is installed and only for the drive/carrier assemblies in the hot-swap cages, *not for drives in any other bays*.

Note: ESD can damage disk drives, boards, and other parts. This system can withstand normal levels of environmental ESD while you are hot-swapping SCSI hard drives. However, we recommend that you do all procedures in this chapter only at an ESD workstation or provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground (any unpainted metal surface) on your system when handling parts.

Installing a Hard Drive

Use this procedure to add an optional hard drive to your system.

1. Power off the system. If locked, unlock and open the right front door.
2. Determine which hard drive cage will house the new hard drive. Open the EMI metal panel located in front of the hard drive cage by turning its two thumb lock screws counter clockwise (see Figure 4-35).
3. The hard drive cage has four slots for mounting the hard drives. Confirm which slot of the hard drive cage the hard drive will be mounted. The SCSI ID (0 through 3) is determined by the slot number from left to right.



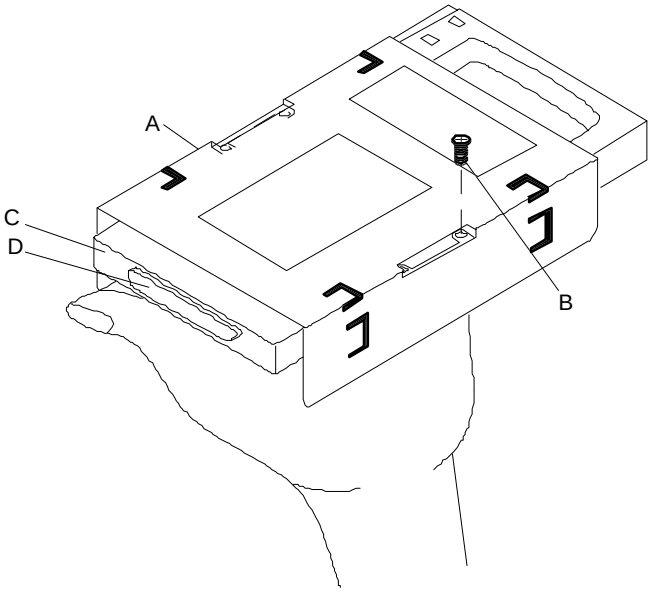
Three hard drive cages

(EMI panel and exterior door shown open)

Figure 4-35. Hard Disk Drive Cages

> ***Note:*** Observe static precautions. Use an antistatic wrist strap.

4. The drive carrier is shipped with the add-on drive. Remove the new drive from its protective wrapper and place it on an antistatic surface. Record the drive model and serial numbers in the equipment log.
5. Position the drive so its SCA connector is near the top surface of the drive. Place the drive on the antistatic surface again. Slide the drive into the carrier with its SCA connector facing toward the front of the carrier (open end).
6. While holding the drive in the carrier with your left hand, align the drive's screw holes with the carrier's screw holes and insert the four screws of appropriate size and length (see Figure 4-36).
7. While pressing the lock button on the carrier handle, open the handle. Align the drive/carrier assembly so it engages the guide rails in the hard drive cage (see Figure 4-37).



Installing 3 1/2inch hard disk drive in carrier for hot-swap bays

A Carrier

B Four screws

C Hard disk drive

D SCA connector

Figure 4-36. Installing Hard Disk in Carrier

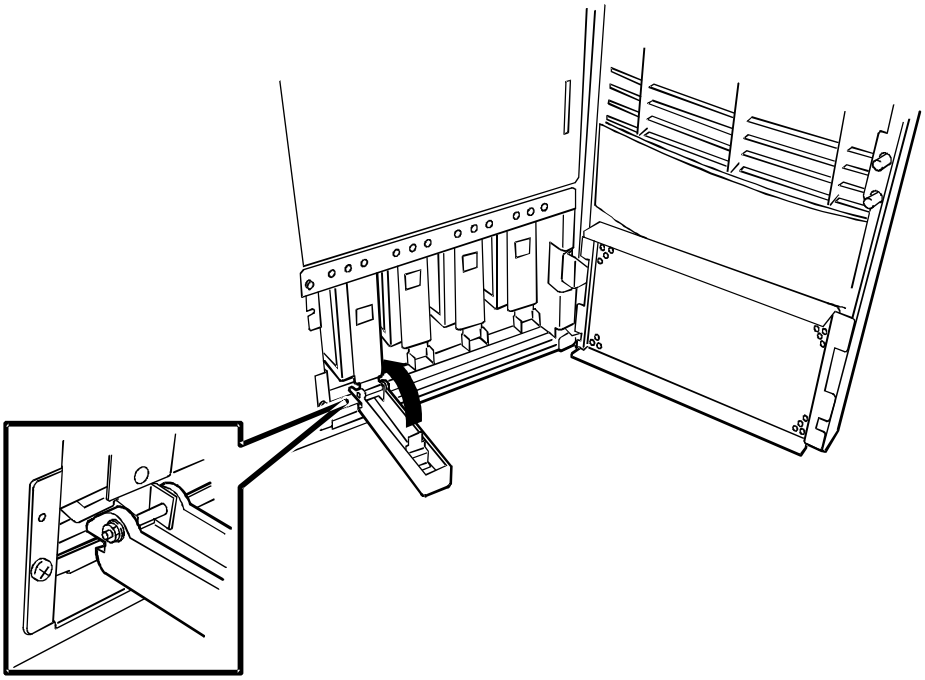


Figure 4-37. Installing Carrier in the System

8. Gently push the assembly into the bay until the drive docks with the backplane connector. Be sure the hook on the bottom of the handle engages the chassis frame and slowly lift the handle. You should hear a click when the handle locks in place.
9. Close the EMI metal panel, and secure with the two thumbscrews.
10. Power on the system and close the front door.

Removing a Hard Drive

Use this procedure to remove a hard drive from your system.

1. Power off the system. If locked, unlock and open the right front door.
2. Determine which hard drive cage contains the hard drive you want to remove. Open the EMI metal panel in front of the hard drive cage by turning its two thumb lock screws counter clockwise (see Figure 4-35).
3. The hard drive cage has four hard drive slots. Confirm which slot of the hard drive cage contains the hard drive to be removed.
4. Grasp the handle of the hard disk's carrier and press down on its thumb-release button (see Figure 4-38).
5. Remove the hard disk and place it in an antistatic wrapper. Close the EMI metal panel, and secure with the two thumbscrews.
6. Power on the system and close the front door.

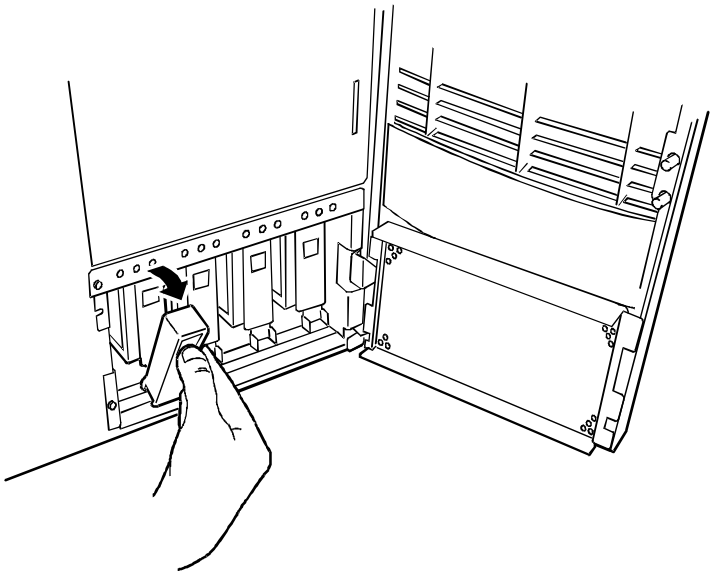


Figure 4-38. Removing the Hard Disk Carrier

Hot-Swapping a Hard Drive

If you are swapping out a faulty hard drive, you can determine which drive to remove by checking the status LEDs that occur in sets of three above each of the four drive bays. See “Status LED Indicator Descriptions” in Chapter 1.

> ***Note:*** When the SCSI drive fault LED indicates a drive fault (steady yellow light), you can remove the drive and swap in a replacement at any time when the drive is not being accessed, without needing to power down the system. However, drive manufacturers caution against moving a drive that is still spinning because of possible damage to the drive.

1. If locked, unlock and open the right front door.
2. Determine which hard drive cage houses the faulty hard drive. Open the EMI metal panel located in front of the hard drive cage by turning its two thumb lock screws counter clockwise (see Figure 4-35).
3. The hard drive cage has four hard drive slots. Check all the drive LEDs to confirm which drive to remove. See “Status LED Indicator Descriptions” in Chapter 1.

> ***Note:*** Depending on the drive fault, the drive may be still spinning when you remove it. Follow the next step exactly when removing drives.

4. Grasp the handle of the hard disk’s carrier and press down on its thumb-release button (see Figure 4-38). Pull the faulty drive out of the bay far enough to disengage the drive connector from the backplane. Wait 30 seconds until the drive spins down, then remove the drive from the drive bay.

> ***Note:*** Observe static precautions. Use an antistatic wrist strap.

5. Place the removed hard drive on an antistatic surface.
6. Remove the replacement drive from its protective wrapper and place it on an antistatic surface. If a drive carrier was not shipped with the replacement drive, remove the carrier from the removed drive.
7. Place the removed hard drive in an antistatic wrapper.
8. Position the replacement drive so its SCA connector is near the top surface of the drive. Place drive on the antistatic surface again. Slide the drive into the carrier with its SCA connector facing toward the front of the carrier (open end).

9. While holding the drive in the carrier with your left hand, align the drive's screw holes with the carrier's screw holes and insert the four screws of appropriate size and length (see Figure 4-36).

10. While pressing the lock button on the carrier handle, open the handle. Align the drive/carrier assembly so it engages the guide rails in the hard drive cage (see Figure 4-37).

11. Gently push the assembly into the bay until the drive docks with the backplane connector. Be sure the hook on the bottom of the handle engages the chassis frame and slowly lift the handle. You will hear a click when the handle locks in place.

12. Close the EMI metal panel, and secure with the two thumbscrews.

13. Close the front door.

5

Problem Solving

- Resetting the System
- Troubleshooting Checklists
- Diagnostic Testing
- Specific Problems and Corrective Actions
- Error Messages
- Error Code Hardware Reference
- Status LED

This chapter helps you identify and solve problems that may occur during system installation or while using your system. The first section of this chapter tells you how to reset your system in the event of problems. The next few sections provide troubleshooting checklists and procedural steps that help you isolate specific system problems. The last sections include error message and status LED information.

⚠ WARNING

The DC push-button on/off switch on the front panel does not turn off the system AC power. Before doing the following procedures, make sure that your system is powered off and unplug the AC power cords from the back of the chassis. Failure to disconnect power before opening your system can result in personal injury and equipment damage.

Resetting the System

There are two ways to reset the system.

Reset button

Pushing the reset button located on the rear panel (see Figure 3-1) clears the system memory, restarts the POST, and reloads the operating system.

Power off/on

Turning the power off and then on with the push-button switch on the front panel has the same effect as pushing the reset button, except that power is halted to all peripherals.

Troubleshooting Checklists

The following paragraphs provide troubleshooting checklists for problems that occur at initial system startup, when you run new application software, and after the system hardware and software were running correctly.

Initial System Startup

Problems that occur at initial system startup are usually caused by incorrect installation or configuration. Hardware failure is a less frequent cause. If you have problems during initial system startup, check the following.

- Are the system power cords properly connected to the system and plugged into NEMA 5-15R outlets (100-120 VAC) or NEMA 6-15R outlets (200-240 VAC)?
- Is AC available at the wall outlets?
- Is the power on/off push-button switch on the front panel in the ON position (power on LED should be lit)?

- Are all cables correctly connected and secured?
- Are all the PCI/ISA option boards fully seated in their connector slots on the system board?
- Are all jumper settings on the system I/O board correct? For jumper information, see Chapter 3, “Configuring Your System.”
- Are all jumper and switch settings on option boards and peripheral devices correct? If applicable, ensure that there are no conflicts; for example, two option boards sharing the same interrupt.
- Are the processor(s) and VRMs fully seated in their slots on the system board? See Chapter 4, “Upgrading Your System,” for installation procedures.
- Are all DIMMs fully seated and installed correctly? See Chapter 4, “Upgrading Your System,” for installation instructions.
- Are all removable media drives and disk drives installed correctly? See Chapter 4, “Upgrading Your System.”
- Is the system's hard drive properly formatted or defined?
- Is the operating system properly loaded? Refer to the operating system documentation.
- Are all drivers properly installed? For information about installing drivers, refer to your network operating system configuration guide.
- Are the configuration settings in BIOS Setup correct? For information about running these utilities, see Chapter 3, “Configuring Your System.”

If the above items are all correct, but the problem reoccurs, refer to *Diagnostic Testing* in this chapter.

Running New Application Software

Problems that occur when you run new application software are usually related to the software. Faulty equipment is much less likely, especially if other software runs correctly. If you have problems while running new application software, check the following.

- Does the system meet the minimum hardware requirements for the software? Refer to the software documentation.
- Is the software an authorized copy? Unauthorized copies often do not work. Obtain an authorized copy of the software.
- If you are running the software from a floppy disk, is it a good copy?
- If you are running the software from a hard disk drive, is the software correctly installed? Were all necessary procedures followed and files installed?
- Are the correct device drivers installed?

- Is the software correctly configured for the system?
- Are you using the software correctly?
- Try a different copy of the software to see if the problem is with the copy you are using.
- If other software runs correctly on the system, contact your vendor about the failing software.

If the problems persist with the software, contact the software vendor's customer service representative.

After System Has Been Running Correctly

Problems that occur after the system hardware and software have been running correctly often indicate equipment failure. However, many situations that are easy to correct can also cause such problems. If you have problems after the system has been running correctly, check the following.

- If you are running the software from a floppy disk, try a new copy of the software.
- If you are running the software from a hard disk drive, try running it from a floppy. If the software runs correctly, there may be a problem with the copy on the hard disk. Reinstall the software on the hard disk drive and try running it again. Make sure all the necessary files are installed.
- If the problem recurs, you may need to reformat the hard disk drive. The drive, drive controller, or system boards may be defective.
- If the problems are intermittent, there may be a loose cable, dirt in the keyboard (if keyboard input is incorrect), a marginal power supply, or other random component failures.
- If you suspect that a transient voltage spike, power outage, or brownout might have occurred, reload the software and try running it again. Symptoms of voltage spikes include a flickering video display, unexpected system reboots, and the system not responding to user commands.

> ***Note:*** Voltage spikes can corrupt or destroy data files on the drive. If you are experiencing voltage spikes on the power line, install a surge suppresser between the power outlet and the system power cords.

If the problem recurs after you have checked and corrected all of the above items, refer to *Diagnostic Testing* in this chapter.

Diagnostic Testing

This section provides a more detailed approach to identification of a system problem and locating its source.

Error Checking

Each time you turn on the system, POST runs automatically and checks the system boards, processors, memory, keyboard, and most installed peripheral devices.

If POST finds an error, it displays an error message. Refer to the *Error Message* section in this chapter for an explanation of each error message.

Troubleshooting Guide

Use the following troubleshooting procedures to help you identify a problem. These general procedures lead you through the following:

- Preparing the system for diagnostic testing
- Monitoring POST while it is running
- Verifying proper operation of key system LEDs
- Confirming loading of the operating system.

Preparing the System for Diagnostic Testing

To prepare the system for diagnostic testing, perform the following:

> ***Note:*** Before disconnecting any peripheral cables from the system, turn off the system and any external peripheral devices. Failure to do so can cause permanent damage to the system and/or the peripheral devices.

1. Turn off the system and all external peripheral devices. Disconnect all devices from the system except the keyboard and video monitor.
2. Make sure the system power cords are plugged into properly grounded AC outlets.
3. Make sure your video display monitor and keyboard are correctly connected to the system. Turn on the video monitor. Set its brightness and contrast controls to at least two-thirds of their maximum ranges (refer to the documentation supplied with your video display monitor).
4. If the operating system normally loads from the hard disk drive, make sure there is no diskette in drive A. Otherwise, place a diskette containing the operating system files in drive A.
5. Turn on the system. If the power indicator LED does not light, refer to *Power Light Does Not Light* found later in this chapter.

Monitoring POST While Running

Each time you turn on the system, POST runs automatically and checks the system board, CPU, memory, keyboard, and most installed peripheral devices.

During the memory test, POST displays the amount of memory that it is able to access and test. Depending on the amount of memory, it may take several minutes to complete the memory test. When the memory test completes, the following is displayed:

```
Press <F2> to enter SETUP
```

Press <**F2**> if you want to run BIOS Setup. When the utility appears, follow the instructions on your monitor to configure BIOS. See Chapter 3, "Configuring Your System." If you do not press <**F2**>, the above message remains for a few seconds and the boot process continues.

When this message appears:

```
Press Ctrl-C to start the Symbios Configuration Utility
```

Press <**Ctrl**+**C**> if you want to configure SCSI devices in your system. When the utility appears, follow the instructions on your monitor to configure the SCSI host adapter settings and run the SCSI disk utilities. See Chapter 3, "Configuring Your System." If you choose not to run the Symbios Configuration Utility, the boot process continues.

If POST finds an error, it displays an error message. This information is useful to your service representative. Refer to the *Error Message* section in this chapter for an explanation of each error code.

The BIOS indicates errors by writing an error code to the PS/2-standard logging area in the Extended BIOS Data Area, and by displaying a message on the screen, which is sometimes preceded by the POST Error Code. The error code will also be logged to the Event Logging area.

Verifying Proper Operation of Key System Indicators

As POST determines the system configuration, it tests for the presence of each mass storage device installed in the system. As each device is checked, its activity indicator should turn on briefly. Check for the following.

- Does the diskette drive activity indicator turn on briefly. If not, refer to Diskette *Drive Activity Indicator Does Not Light* in this chapter.
- If a second diskette drive is installed, does its activity indicator turn on briefly. If not, refer to *Diskette Drive Activity Indicator Does Not Light* in this chapter.
- If there is a hard disk drive or SCSI devices installed in the system, does the hard disk drive activity indicator turn on briefly. If not, refer to *Hard Disk Drive Activity Indicator Does Not Light* in this chapter.

Confirming Loading of the Operating System

Once the system boots up, the operating system prompt appears on the screen. The prompt varies according to the operating system. If the operating system prompt does not appear, refer to *Running New Application Software* in this chapter.

Specific Problems and Corrective Actions

This section provides possible solutions for the following specific problems:

- Power LED does not light
- System cooling fans do not rotate
- No characters appear on screen
- Characters on the screen appear distorted or incorrect
- Floppy disk drive access LED does not light
- Hard disk drive access LED does not light
- Problems with application software.

Try the solutions in the order given. If you cannot correct the problem, contact your service representative for assistance.

Power LED Does Not Light

Check the following.

- Is the system operating normally? If so, the power LED is probably defective.
- Are there other problems with the system? If so, check the items listed under *System Cooling Fans Do Not Rotate*.

System Cooling Fans Do Not Rotate

> ***Note:*** In addition to the cooling fans that are an integral part of each power supply, the system has an option board fan, four CPU fans, and two memory fans. The four CPU fans are redundant in configuration. This means if one fan fails its associated fan changes its rotating speed to high. There are no serviceable components inside the power supply. If the power supply is opened, the manufacturer's warranty is voided.

Check the following.

- Is AC power available at the wall outlet?
- Are the system power cords properly connected to the system and the AC wall outlets?

- Are the power supply LED status lamps on each supply lit? If either LED on a supply is off, the power supply is defective and must be replaced.
- Is the power connector for the cooling fan connected to the system I/O board (option board fan), the CPU base board (CPU fans), and the power backboard panel #1 (memory fans)?
- Is the front panel power on indicator lit? If this LED is amber, a defective power supply is indicated.

If the switches and connections are correct and the power outlet is functioning, a power supply has probably failed. Contact your service representative for assistance.

No Characters Appear On Screen

Check the following.

- Is the riser card fully seated in the system I/O board connector? The riser card is the small card that the mouse and keyboard plug into.
- Is the keyboard working?
- Is the video display plugged in and turned on?
- Are the brightness and contrast controls properly adjusted?
- Are the video display switch settings correct?
- If you are using an option video controller board, verify that the video controller board is fully seated in the system board connector.
- Is the video display signal cable properly installed?

If there are still no characters on the screen after you check the above, contact your service representative or authorized dealer for assistance.

Characters are Distorted or Incorrect

Check the following.

- Are the brightness and contrast controls properly adjusted on the video display? Refer to the documentation supplied with your video display.
- Are the video display signal and power cables properly installed?
- If the problem persists, the video display may be faulty or it may be the incorrect type. Contact your service representative for assistance.

Floppy Disk Drive Activity LED Does Not Light

Check the following.

- Are the floppy disk drive power and signal cables properly installed?
- Are all relevant switches and jumpers on the floppy disk drive set correctly?
- Is the floppy disk drive properly configured in Setup?

If you are using the onboard floppy disk controller, use BIOS Setup to make sure that Onboard Floppy is set to Enabled. Conversely, to use an optional fixed/floppy disk controller, make sure that Onboard Floppy is set to Disabled. For information about running Setup, see Chapter 3, "Configuring Your System."

If the problem persists, there may be a problem with the floppy disk drive, system I/O board, or drive signal cable. Contact your service representative for assistance.

Hard Disk Drive Activity LED Does Not Light

If you have installed one or more hard disk drives in your system, check the following.

- Is the optional disk controller board fully seated in the system I/O board connector?
- Is the disk drive seated properly?
- Are the jumpers on the system I/O board set correctly?

If you received error messages, refer to the *Error Message* section for information about error messages.

If the problem persists, there may be a problem with the hard disk drive, the optional controller board, system I/O board, drive signal cable, or LED

Error Messages

The server status is displayed in 16 digits of alphanumeric characters on the liquid crystal display (LCD) on the front of the server. Use this indication together with the status LED indications to solve problems that may occur while using your system.

> ***Note:*** Record the indication of LCD before contacting your service representative. An alarm indication is useful when maintaining the server.

Alarm Indication during POST

Each time you turn on the system, POST runs automatically. During POST, the test that is being executed is displayed on the LCD. If the same code has been displayed for more than 5 minutes, an occurrence of fatal error is assumed. Record the code displayed on LCD, then contact your service representative.

When an alarm that restricts operation (such as degradation function) or that can be recovered by re-setup has occurred, an error code is displayed on the LCD. (An error message is also displayed on the display unit.)

Table 5-1 lists the error codes and messages you may see during POST.

Table 5-1. POST Error Codes and Messages

Error Code and Message		Explanation	Action
0200	Failure Fixed Disk	Hard disk failure	Replace the hard disk.
0210	Stuck Key	The key is stuck on when pressed.	Stop pressing the key.
0211	Keyboard error	Keyboard error	Replace the keyboard.
0212	Keyboard Controller Failed	Keyboard controller failed.	Ask your service representative to replace the keyboard.
0213	Keyboard locked – Unlock key switch	Keyboard is locked.	Start Setup to set up the keyboard correctly.
0220	Monitor type does not match CMOS – Run SETUP	The display unit is incorrectly setup.	Start Setup to set up the monitor correctly.
0230	System RAM Failed at offset	System RAM error. Offset address	Ask your service representative to replace the memory module.
0231	Shadow RAM Failed at offset	Shadow RAM error. Offset address	Ask your service representative to replace the memory module.
0232	Extended RAM Failed at address line	Extended RAM error. Offset address	Ask your service representative to replace the motherboard.
0233	Memory type mixing detected	Memory devices of different types are installed.	Install correct memory devices specified by NEC.
0234	Single-bit ECC error	A 1-bit memory error occurred.	Contact your service representative.
0235	Multiple-bit ECC error occurred	A multi-bit memory error occurred.	Contact your service representative.

Table 5-1. POST Error Codes and Messages (continued)

Error Code and Message		Explanation	Action
0250	System battery is dead – Replace and run SETUP	No system battery is installed.	Contact your service representative to install the battery. (After restarting the computer, start the Setup Utility to set required values again.)
0251	System CMOS checksum bad – Default configuration used	Checksum of system CMOS is not correct.	The default values were set. Start the Setup Utility to set required values again.
0260	System timer error	System timer error	Contact your service representative.
0270	Real time clock error	Realtime lock error	Contact your service representative.
0271	Check date and time setting	Realtime clock is set incorrectly.	Start the Setup Utility to set the time again. If the same error occurs still, contact your service representative.
0280	Previous boot incomplete – Default configuration used	The previous activation has not been terminated normally.	If the system is started without any modification, it is started in the uncached status. Correct the setup values by using the Setup Utility and start the system again.
02B0	Diskette drive A error	Error in floppy disk A	Contact your service representative.
02B1	Diskette drive B error	Error in floppy disk B	Contact your service representative.
02B2	Incorrect Drive A type – run SETUP	The type of drive A is incorrect.	Start the Setup Utility to set required values again.
02B3	Incorrect Drive B type – run SETUP	The type of drive B is incorrect.	Start the Setup Utility to set required values again.
02D0	System cache error – Cache disabled	System cache error	No cache can be used. Contact your service representative.
0B1B	PCI System Error on Bus/Device/Function	A PCI system error occurred in bus/device/function.	Contact your service representative.
0B1C	PCI Parity Error on Bus/Device/Function	A PCI parity error occurred in bus/device/function.	Contact your service representative.
0B22	CPUs are installed out of order	CPUs are installed in incorrect order.	This does not indicate an error. However, change the slot in which the CPU is installed.
0B30	Fan 1 Alarm occurred.	Memory cooling fan error	Check whether the fan is clogged. Clean it if the fan is covered with dust. If no error is found or the failure is cleared in spite of cleaning, contact your service representative.
0B31	Fan 2 Alarm occurred.	Memory cooling fan error	Same as above
0B32	Fan 3 Alarm occurred.	CPU cooling fan error	Same as above

Table 5-1. POST Error Codes and Messages (continued)

Error Code and Message		Explanation	Action
0B33	Fan 4 Alarm occurred.	CPU cooling fan error	Same as above
0B34	Fan 5 Alarm occurred.	CPU cooling fan error	Same as above
0B35	Fan 6 Alarm occurred.	CPU cooling fan error	Same as above
0B36	Fan 7 Alarm occurred.	Optional board cooling fan error	Same as above
0B40	Invalid System Configuration Data	System configuration data is damaged.	Start the Setup Utility to set the time again. If the same error reoccurs, contact your service representative.
0B41	System Configuration Data Read error	Read error on the data configuring the system	Ask your service representative for System I/O board replacement.
0B42	Resource Conflict	The PCI board resource is not properly mapped.	Start the Setup Utility for reset. If the same error reoccurs, contact your service representative.
0B43	WARNING: IRQ not configured	The PCI board interrupt is not properly set.	Same as above.
0B44	Expansion ROM not initialized	The expansion ROM on the PCI board is not initialized.	Check PCI board installation. If the same error reoccurs, ask your service representative for System I/O board replacement.
0B45	System Configuration Data Write Error	Write error on the data configuring the system.	Ask your service representative for System I/O board replacement.
0B50	CPU#1 with error taken off line.	Because an error was detected in CPU #1, it was disabled.	The CPU is disabled. Contact your service representative.
0B51	CPU#2 with error taken off line.	Because an error was detected in CPU #2, it was disabled.	Same as above.
0B52	CPU#3 with error taken off line.	Because an error was detected in CPU #3, it was disabled.	Same as above.
0B53	CPU#4 with error taken off line.	Because an error was detected in CPU #4, it was disabled.	Same as above.
0B54	CPU#5 with error taken off line.	Because an error was detected in CPU #5, it was disabled.	Same as above.
0B55	CPU#6 with error taken off line.	Because an error was detected in CPU #6, it was disabled.	Same as above.
0B56	CPU#7 with error taken off line.	Because an error was detected in CPU #7, it was disabled.	Same as above.
0B57	CPU#8 with error taken off line.	Because an error was detected in CPU #8, it was disabled.	Same as above.
0B58	Forced to use CPU#1 with error	An error was detected in CPU#1.	The system is started forcibly though an error is detected in the CPU displayed. Contact your service representative.

Table 5-1. POST Error Codes and Messages (continued)

Error Code and Message		Explanation	Action
0B59	Forced to use CPU#2 with error	An error was detected in CPU#2.	Same as above.
0B5A	Forced to use CPU#3 with error	An error was detected in CPU#3.	Same as above.
0B5B	Forced to use CPU#4 with error	An error was detected in CPU#4.	Same as above.
0B5C	Forced to use CPU#5 with error	An error was detected in CPU#5.	Same as above.
0B5D	Forced to use CPU#6 with error	An error was detected in CPU#6.	Same as above.
0B5E	Forced to use CPU#7 with error	An error was detected in CPU#7.	Same as above.
0B5B\F	Forced to use CPU#8 with error	An error was detected in CPU#8.	Same as above.
0B60	DIMM group #1 has been disabled	A memory error was detected in memory DIMM group #1. Memory DIMM group #1 is disabled.	Contact your service representative.
0B61	DIMM group #2 has been disabled	A memory error was detected in memory DIMM group #2. Memory DIMM group #2 is disabled.	Contact your service representative.
0B62	DIMM group #3 has been disabled	A memory error was detected in memory DIMM group #3. Memory DIMM group #3 is disabled.	Contact your service representative.
0B63	DIMM group #4 has been disabled	A memory error was detected in memory DIMM group #4. Memory DIMM group #4 is disabled.	Contact your service representative.
0B64	DIMM group #5 has been disabled	A memory error was detected in memory DIMM group #5. Memory DIMM group #5 is disabled.	Contact your service representative.
0B65	DIMM group #6 has been disabled	A memory error was detected in memory DIMM group #6. Memory DIMM group #6 is disabled.	Contact your service representative.
0B66	DIMM group #7 has been disabled	A memory error was detected in memory DIMM group #7. Memory DIMM group #7 is disabled.	Contact your service representative.
0B67	DIMM group #8 has been disabled	A memory error was detected in memory DIMM group #8. Memory DIMM group #8 is disabled.	Contact your service representative.
0B6F	DIMM group with error is enabled	Memory error was detected.	The system is forcibly started because errors are detected in all memory devices. Contact your service representative.
0B70	The error occurred during temperature sensor reading	An error was detected in the middle of detection of abnormal temperature.	Contact your service representative.

Table 5-1. POST Error Codes and Messages (continued)

Error Code and Message		Explanation	Action
0B71	System Temperature out of the range	Abnormal temperature was detected.	Turn off the power once. Then check whether the fan is clogged. Clean it if the fan is covered with dust. If no error is found or the failure is cleared in spite of cleaning, contact your service representative.
0B74	The error occurred during voltage sensor reading	An error occurred during detection of voltage.	Contact your service representative.
0B75	System Voltage out of range	Abnormal system voltage was detected.	Contact your service representative.
0B78	The error occurred during fan sensor reading	An error was detected during read of FAN sensor.	Contact your service representative.
0B7C	The error occurred during the redundant power module confirmation	An error occurred while redundant power supply was configured.	Contact your service representative.
0B80	IBF or OBF Check Error occurred by the access via System Management Controller	No response was issued for access to System Management Controller.	Contact your service representative.
0B81	System Management Controller Firmware CRC check error occurred	An error occurred in firmware of System Management Controller.	Contact your service representative.
0B82	Hardware error of System Management Controller occurred	A hardware error was detected in System Management Controller.	Contact your service representative.
0B83	All Device of 1st System Management Bus became not able to accessed	SMBus could not be accessed via System Management Controller.	Contact your service representative.
0B84	Some Device of 1st System Management Bus became not able to accessed	No device could be accessed through SMBus access via System Management Controller.	Contact your service representative.
0BA0	Address Array on CPU box #1 error		Contact your service representative.
0BA1	Address Array on CPU box #2 error		Contact your service representative.
0BA2	Data Array on CPU box #1 error		Contact your service representative.
0BA3	Data Array on CPU box #2 error		Contact your service representative.
0BAB	PCI Bus #3 connection hardware error occurred		Contact your service representative.
0BB0	SMBIOS – SROM data read error	Reading SROM data failed.	Contact your service representative.
0BB1	SMBIOS – SROM data checksum bad	SROM data checksum was incorrect.	Contact your service representative.

Table 5-1. POST Error Codes and Messages (continued)

Error Code and Message		Explanation	Action
0C00	RomPilot reports error number xx	RomPilot initialization error	Perform the configuration again. If the error occurs, a hardware failure may occur. Contact your service representative.

Alarm Indication During System Operation

Table 5-2 lists the alarm indications displayed on LCD during server operation.

Table 5-2. Operational Error Codes and Messages

Error Code and Message		Explanation	Action
15FF	CPU Bus Err	CPU bus error	Check CPU installation or termination board installation. If the same error reoccurs, contact your service representative.
0B01	CPU Error 1	CPU#1 error	Check CPU installation or termination board installation. If the same error reoccurs, contact your service representative.
0B02	CPU Error 2	CPU#2 error	Check CPU installation or termination board installation. If the same error reoccurs, contact your service representative.
0B03	CPU Error 3	CPU#3 error	Check CPU installation or termination board installation. If the same error reoccurs, contact your service representative.
0B04	CPU Error 4	CPU#4 error	Check CPU installation or termination board installation. If the same error reoccurs, contact your service representative.
0B05	CPU Error 5	CPU#5 error	Check CPU installation or termination board installation. If the same error reoccurs, contact your service representative.
0B06	CPU Error 6	CPU#6 error	Check CPU installation or termination board installation. If the same error reoccurs, contact your service representative.
0B07	CPU Error 7	CPU#7 error	Check CPU installation or termination board installation. If the same error reoccurs, contact your service representative.
0B08	CPU Error 8	CPU#8 error	Check CPU installation or termination board installation. If the same error reoccurs, contact your service representative.
0B11	CPU Thermal	CPU#1 temperature error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
0B12	CPU Thermal	CPU#2 temperature error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
0B13	CPU Thermal	CPU#3 temperature error	Clean the cooling fan. If the same error reoccurs, contact your service representative.

Table 5-2. Operational Error Codes and Messages (continued)

Error Code and Message		Explanation	Action
0B14	CPU Thermal	CPU#4 temperature error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
0B15	CPU Thermal	CPU#5 temperature error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
0B16	CPU Thermal	CPU#6 temperature error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
0B17	CPU Thermal	CPU#7 temperature error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
0B18	CPU Thermal	CPU#8 temperature error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
1052	Fan Alarm	Memory cooling fan error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
1053	Fan Alarm	Memory cooling fan error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
1054	Fan Alarm	CPU cooling fan error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
1055	Fan Alarm	CPU cooling fan error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
1056	Fan Alarm	CPU cooling fan error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
1057	Fan Alarm	CPU cooling fan error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
1058	Fan Alarm	Optional board cooling fan error	Clean the cooling fan. If the same error reoccurs, contact your service representative.
2101	Memory Err	DIMM error on Memory backboard #1	Check memory board installation or memory backboard installation. See the section “Memory Error Messages” described earlier for locations of the memory board slots. If the same error reoccurs, contact your service representative.
2102	Memory Err	DIMM error on Memory backboard #1	Same as above.
2103	Memory Err	DIMM error on Memory backboard #1	Same as above.

Table 5-2. Operational Error Codes and Messages (continued)

Error Code and Message		Explanation	Action
2104	Memory Err	DIMM error on Memory backboard #1	Same as above.
2105	Memory Err	DIMM error on Memory backboard #1	Same as above.
2106	Memory Err	DIMM error on Memory backboard #1	Same as above.
2107	Memory Err	DIMM error on Memory backboard #1	Same as above.
2108	Memory Err	DIMM error on Memory backboard #1	Same as above.
2109	Memory Err	DIMM error on Memory backboard #1	Same as above.
210A	Memory Err	DIMM error on Memory backboard #1	Same as above.
210B	Memory Err	DIMM error on Memory backboard #1	Same as above.
210C	Memory Err	DIMM error on Memory backboard #1	Same as above.
210D	Memory Err	DIMM error on Memory backboard #1	Same as above.
210E	Memory Err	DIMM error on Memory backboard #1	Same as above.
210F	Memory Err	DIMM error on Memory backboard #1	Same as above.
2110	Memory Err	DIMM error on Memory backboard #1	Same as above.
2111	Memory Err	DIMM error on Memory backboard #2	Same as above.
2112	Memory Err	DIMM error on Memory backboard #2	Same as above.
2113	Memory Err	DIMM error on Memory backboard #2	Same as above.
2114	Memory Err	DIMM error on Memory backboard #2	Same as above.
2115	Memory Err	DIMM error on Memory backboard #2	Same as above.
2116	Memory Err	DIMM error on Memory backboard #2	Same as above.
2117	Memory Err	DIMM error on Memory backboard #2	Same as above.
2118	Memory Err	DIMM error on Memory backboard #2	Same as above.
2119	Memory Err	DIMM error on Memory backboard #2	Same as above.

Table 5-2. Operational Error Codes and Messages (continued)

Error Code and Message		Explanation	Action
211A	Memory Err	DIMM error on Memory backboard #2	Same as above.
211B	Memory Err	DIMM error on Memory backboard #2	Same as above.
211C	Memory Err	DIMM error on Memory backboard #2	Same as above.
211D	Memory Err	DIMM error on Memory backboard #2	Same as above.
211E	Memory Err	DIMM error on Memory backboard #2	Same as above.
211F	Memory Err	DIMM error on Memory backboard #2	Same as above.
2120	Memory Err	DIMM error on Memory backboard #2	Same as above.
2201	Memory Err	DIMM Pair error on Memory backboard #1	Same as above.
2203	Memory Err	DIMM Pair error on Memory backboard #1	Same as above.
2205	Memory Err	DIMM Pair error on Memory backboard #1	Same as above.
2207	Memory Err	DIMM Pair error on Memory backboard #1	Same as above.
2209	Memory Err	DIMM Pair error on Memory backboard #1	Same as above.
220B	Memory Err	DIMM Pair error on Memory backboard #1	Same as above.
220D	Memory Err	DIMM Pair error on Memory backboard #1	Same as above.
220F	Memory Err	DIMM Pair error on Memory backboard #1	Same as above.
2211	Memory Err	DIMM Pair error on Memory backboard #2	Check memory board installation or memory backboard installation. See the section “Memory Error Messages” described earlier for locations of the memory board slots. If the same error reoccurs, contact your service representative.
2213	Memory Err	DIMM Pair error on Memory backboard #2	Same as above.
2215	Memory Err	DIMM Pair error on Memory backboard #2	Same as above.

Table 5-2. Operational Error Codes and Messages (continued)

Error Code and Message		Explanation	Action
2217	Memory Err	DIMM Pair error on Memory backboard #2	Same as above.
2219	Memory Err	DIMM Pair error on Memory backboard #2	Same as above.
221B	Memory Err	DIMM Pair error on Memory backboard #2	Same as above.
221D	Memory Err	DIMM Pair error on Memory backboard #2	Same as above.
221F	Memory Err	DIMM Pair error on Memory backboard #2	Same as above.
	PCI PERR	PCI bus parity error	Check PCI board installation. If the same error reoccurs, contact your service representative.
0901	PCI PERR	PCI bus#1 parity error	Same as above.
0902	PCI PERR	PCI bus#2 parity error	Same as above.
0903	PCI PERR	PCI bus#3 parity error	Same as above.
	PCI SERR	PCI bus system error	Same as above.
0A01	PCI SERR	PCI bus#1 system error	Same as above.
0A02	PCI SERR	PCI bus#2 system error	Same as above.
0A03	PCI SERR	PCI bus#3 system error	Same as above.
1012	Power +3.3V	3.3V power failure	Ask your service representative for power unit or board replacement.
1013	Power +5V	5V power failure	Ask your service representative for power unit or board replacement.
1014	Power +12V	12V power failure	Ask your service representative for power unit or board replacement.
1022	Power +1.5V	1.5V power failure	Ask your service representative for power unit or board replacement.
1023	Power +5.0VS	5V power failure	Ask your service representative for power unit or board replacement.
1010	Power CPU#1	CPU#1 power failure	Check CPU VRM installation. If the same error reoccurs, contact your service representative.
1011	Power CPU#2	CPU#2 power failure	Same as above.
1020	Power CPU#3	CPU#3 power failure	Same as above.
1021	Power CPU#4	CPU#4 power failure	Same as above.

Table 5-2. Operational Error Codes and Messages (continued)

Error Code and Message		Explanation	Action
1030	Power CPU#5	CPU#5 power failure	Same as above.
1031	Power CPU#6	CPU#6 power failure	Same as above.
1032	Power CPU#7	CPU#7 power failure	Same as above.
1040	Power CPU#8	CPU#8 power failure	Same as above.
1040	Power Error 1	Power unit #1 (bottom left) failure	Ask your service representative for replacement of the failed power unit.
1041	Power Error 2	Power unit #2 (bottom left) failure	Ask your service representative for replacement of the failed power unit.
1042	Power Error 3	Power unit #3 (bottom left) failure	Ask your service representative for replacement of the failed power unit.
1043	Power Error 4	Power unit #4 (bottom left) failure	Ask your service representative for replacement of the failed power unit.
1028	Power L2 #1	CPU L2 cache power failure	Check CPU VRM installation. If the same error reoccurs, contact your service representative.
1029	Power L2 #2	CPU L2 cache power failure	Check CPU VRM installation. If the same error reoccurs, contact your service representative.
102A	Power L2 #3	CPU L2 cache power failure	Check CPU VRM installation. If the same error reoccurs, contact your service representative.
102B	Power L2 #4	CPU L2 cache power failure	Check CPU VRM installation. If the same error reoccurs, contact your service representative.
10F0	Pow Major B	Power major alarm	Contact your service representative.
105F	SCSI Open	The front door is open.	This is a warning, not an error.
105E	HPC Open	The PCI slot door on the top cover is open.	This is a warning, not an error.
DUMP		The DUMP switch is pressed.	This is not an error.
Sleep:x		The system is running in the power save mode. (“x” indicates the power save mode level (1 through 4).)	This is not an error. Pressing the SLEEP switch restores the original state. Level setup and definitions depend on the OS.

Table 5-2. Operational Error Codes and Messages (continued)

Error Code and Message		Explanation	Action
SMI Timeout		The system is stalled due to a hardware failure.	A critical error occurred. Contact your service representative.
SMBus Err xxyy		SMBus device error. (xx: channel, yy: status)	Contact your service representative.
ISA Error		ISA I/O check error	Check ISA board installation. If the same error reoccurs, contact your service representative.
1017	Thermal Hi	PCI (unknown location) high temperature error	Shut down the server to check if fans and other components are covered with dust. When a low temperature error occurred, raise the room temperature to warm up the server for operations. If there appears to be no cause of a malfunction, contact your service representative.
1061	Thermal Hi	Front panel high temperature error	Same as above.
1063	Thermal Hi	Baseboard high temperature error	Same as above.
1068	Thermal Hi	CPU#1 high temperature error	Same as above.
1069	Thermal Hi	CPU#2 high temperature error	Same as above.
106A	Thermal Hi	CPU#3 high temperature error	Same as above.
106B	Thermal Hi	CPU#4 high temperature error	Same as above.
106C	Thermal Hi	CPU#5 high temperature error	Same as above.
106D	Thermal Hi	CPU#6 high temperature error	Same as above.
106E	Thermal Hi	CPU#7 high temperature error	Same as above.
106F	Thermal Hi	CPU#8 high temperature error	Same as above.
1017	Thermal Lo	PCI (unknown location) low temperature error	Shut down the server to check if fans and other components are covered with dust. When a low temperature error occurred, raise the room temperature to warm up the server for operations. If there appears to be no cause of a malfunction, contact your service representative.
1061	Thermal Lo	Front panel low temperature error	Same as above.
1063	Thermal Lo	Baseboard low temperature error	Same as above.
1068	Thermal Lo	CPU#1 low temperature error	Same as above.
1069	Thermal Lo	CPU#2 low temperature error	Same as above.
106A	Thermal Lo	CPU#3 low temperature error	Same as above.
106B	Thermal Lo	CPU#4 low temperature error	Same as above.

Table 5-2. Operational Error Codes and Messages (continued)

Error Code and Message		Explanation	Action
106C	Thermal Lo	CPU#5 low temperature error	Same as above.
106D	Thermal Lo	CPU#6 low temperature error	Same as above.
106E	Thermal Lo	CPU#7 low temperature error	Same as above.
106F	Thermal Lo	CPU#8 low temperature error	Same as above.
1017	Thermal Wrn	PCI (unknown location) temperature warning	Same as above.
1061	Thermal Wrn	Front panel temperature warning	Same as above.
1063	Thermal Wrn	Baseboard temperature warning	Same as above.
1068	Thermal Wrn	CPU#1 temperature warning	Same as above.
1069	Thermal Wrn	CPU#2 temperature warning	Same as above.
106A	Thermal Wrn	CPU#3 temperature warning	Same as above.
106B	Thermal Wrn	CPU#4 temperature warning	Same as above.
106C	Thermal Wrn	CPU#5 temperature warning	Same as above.
106D	Thermal Wrn	CPU#6 temperature warning	Same as above.
106E	Thermal Wrn	CPU#7 temperature warning	Same as above.
106F	Thermal Wrn	CPU#8 temperature warning	Same as above.
0C00	WDT Timeout	Watch-dog timer time-out	Contact your service representative.

Error Messages During Power-Off

If an error is displayed on the LCD during power-off, record the code displayed and contact your service representative.

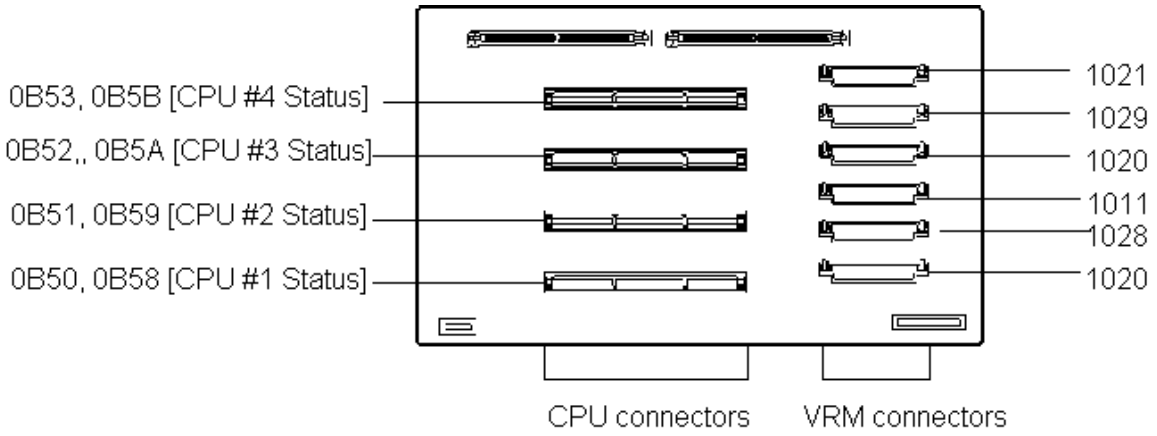
Table 5-3 lists the error messages you may see during power-off.

Table 5-3. Power-Off Error Messages

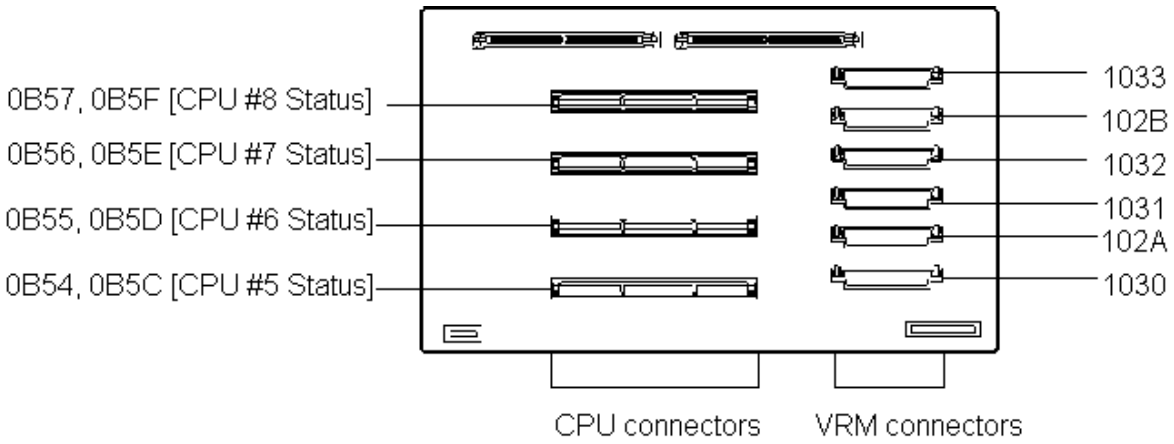
Error message on LCD	Description	Measures
CPU Missing	The CPU or terminator board is not connected.	Connect the CPU or terminator board. If the symptom remains unchanged, contact your service representative to replace the CPU, terminator board, or system board with a new one.
FM erase NG FM01	The flash memory cannot be erased.	Contact your service representative to replace the system board with a new one.
FM Log Full FM04	The log is full of data.	Start the BIOS Setup Utility (see Chapter 3) to set “Error Log Initialization” in “System Hardware” to “Yes.” Then restart the system.
FM Vpp low FM03	The voltage to flush memory is too low.	Contact your service representative to replace the system board or the power unit or board with a new one.
FM write NG FM02	No data can be written to flush memory.	Contact your service representative to replace the system board with a new one.
FP/B SROM Error	It is impossible to access SROM on the front panel.	Connect the cables again. If the symptom remains unchanged, contact your service representative to replace the front panel or system board with a new one.
LOAD SMC FW YE04	A CRC check error is detected in the firmware for the System Management Controller.	Reload the firmware. Ask your service representative how to load firmware.
RAM TF1 ERR YE02	One or more memory devices in the System Management Controller are defective.	Contact your service representative to replace the system board with a new one.
RAM TF2 ERR YE03	One or more extension memory devices in the System Management Controller are defective.	Contact your service representative to replace the system board with a new one.
ROM TF ERR YE01	The firmware for the System Management Controller is defective.	Contact your service representative to replace the system board with a new one.
SIDE COVER OPEN	The side cover is not closed securely.	Close the side cover. If the error message keeps appearing, contact your service representative.

Error Code Hardware Reference

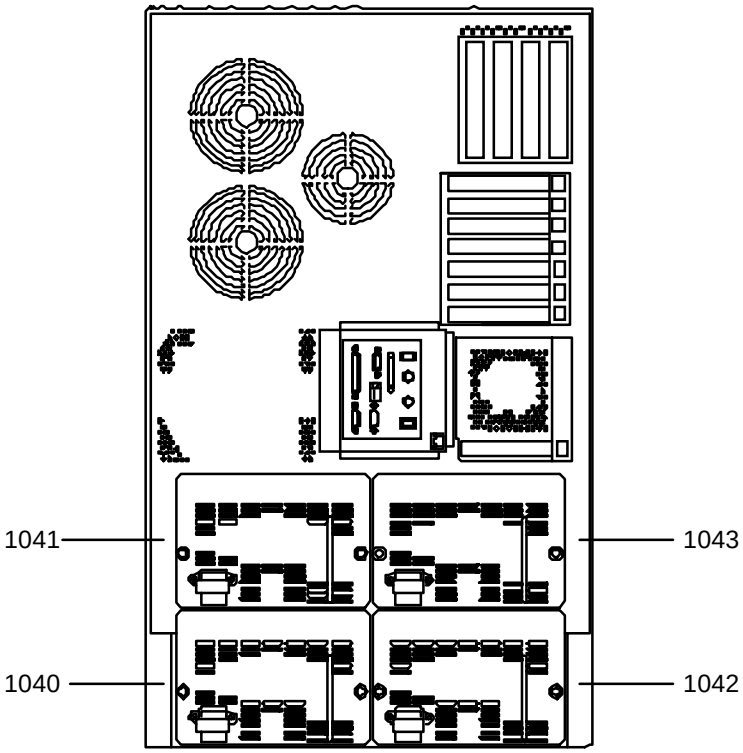
The following hardware illustrations show the probable locations of hardware failures as defined by specific error codes listed in Tables 5-1 and 5-2.



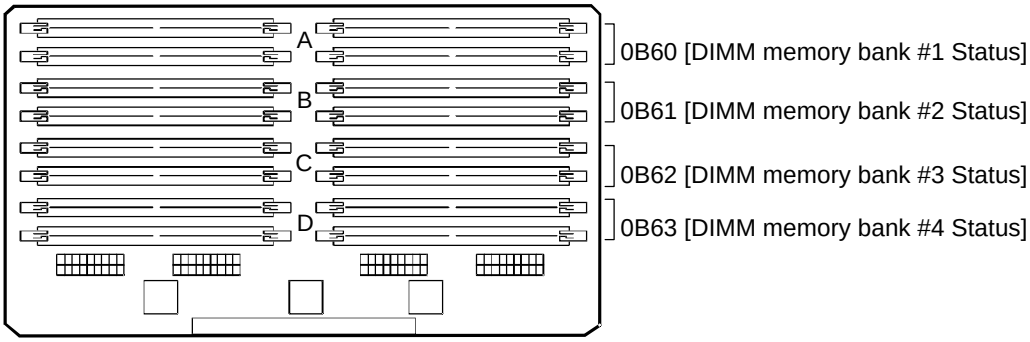
Standard CPU Baseboard (Lower Board)



Optional CPU Baseboard (Upper Board)

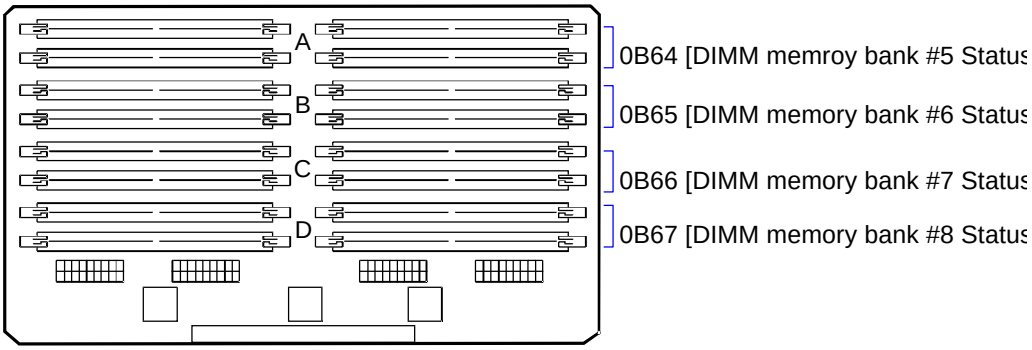


Power Units



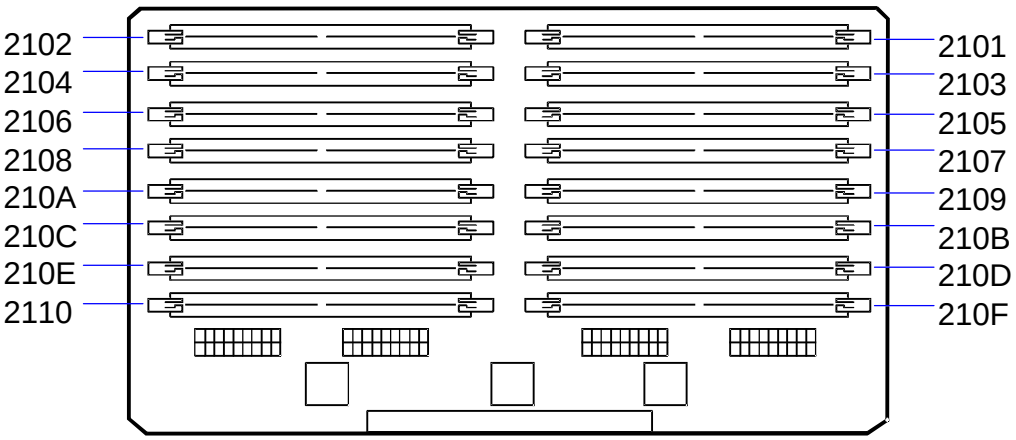
Error Indications by Memory Bank

Memory Backboard 1



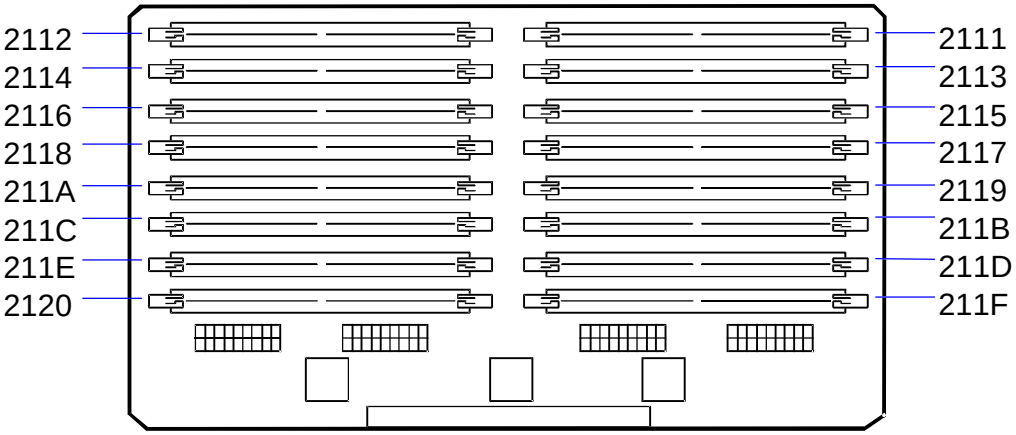
Error Indications by Memory Bank

Memory Backboard 2



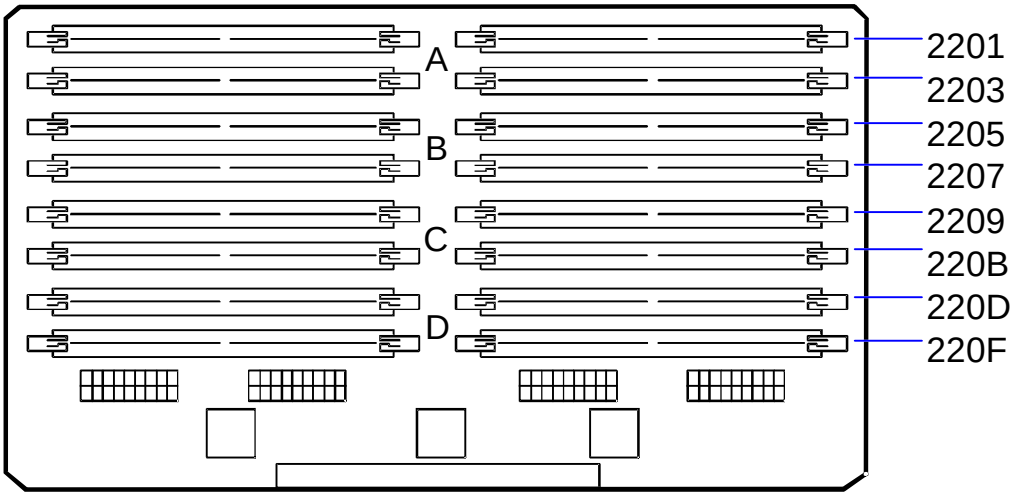
Error Indications by DIMM Socket

Memory Backboard 1



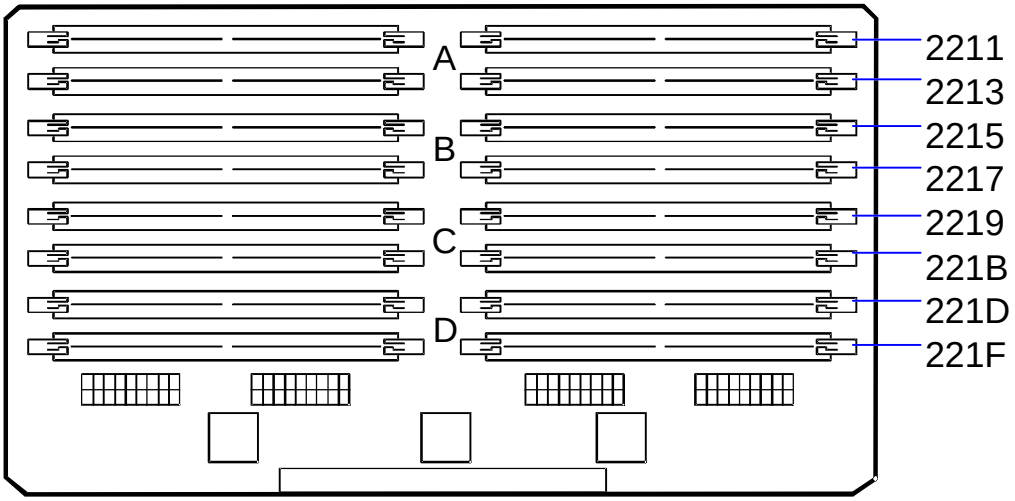
Error Indications by DIMM Socket

Memory Backboard 2



Error Indications by DIMM Pair

Memory Backboard 1



Error Indications by DIMM Pair

Memory Backboard 2

Status LEDs

The following paragraphs list and describe the various system and disk status LED indicators and provides a user response for the various status conditions. Once your server is up and running, you can monitor server operation through the system status LED panel indicators and the SCSI device status LED panel indicators. See Table 5-3 and Table 5-4 for a list and description of the LED indicators and Table 5-5 for a list of the system status abnormal conditions.

If any problems persist, contact your service representative for assistance.

Table 5-3. System Status LED Indicators

LED	Status	Description	Response
Power	Off	Power OFF	None required (normal)
	Green	Power ON	None required (normal)
	Amber	System power supply failure or in sleep mode	Replace failed power supply module or check to see if the system is in sleep mode.
Status	Off	Power OFF	None required (normal)
	Green	No alarms	None required (normal)
	Amber	Abnormal condition (see Table 5-5)	Check condition
Disk	Off	Not accessing disk drives	None required (normal)
	Amber	Internal disk drive failure	Check disk drive status LEDs
	Green	Accessing disk drives	None required (normal)

Table 5-4. Disk Drive Status LED Panel Indicators

LED	Status	Description	Response
Disk Drive Present	Off	Disk drive not present	None required (normal)
	Green	Disk drive present	None required (normal)
Disk Drive Activity	Off	Not accessing disk drive	None required (normal)
	Green	Accessing disk drive	None required (normal)
Disk Drive Status	Off	No alarms	None required (normal)
	Amber (Steady light)	Disk drive failure	Replace disk drive
	(Flashing light)	Rebuilding data (in disk array configuration only)	None required (normal)

Table 5-5. System Status Abnormal Conditions

LED (Amber)	Conditions
System Status	Chassis intrusion (front cover) Unit fan alarm Memory 2-bit error (SERR) P6 bus error (SERR) Thermal sensor Temperature Voltage CPU thermal trip PCI PERR# (OPB/ESC detect) PCI SERR# CPU internal error WDT IOCHK

A

System Cabling

- Before You Begin
- Static Precautions
- RAID and SCSI Bus Configuration

This appendix contains information and procedures on cabling configurations used in your system. The configurations include:

- Ultra2-wide SCSI bus
- RAID controller.

Before You Begin

⚠ WARNING

The DC push-button on/off switch on the front panel does not turn off the system AC power. Before doing the procedures in this chapter, make sure that your system is powered off and unplug the AC power cord from the back of the chassis. Failure to disconnect power before opening your system can result in personal injury and equipment damage.

Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide ESD protection by wearing an antistatic wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

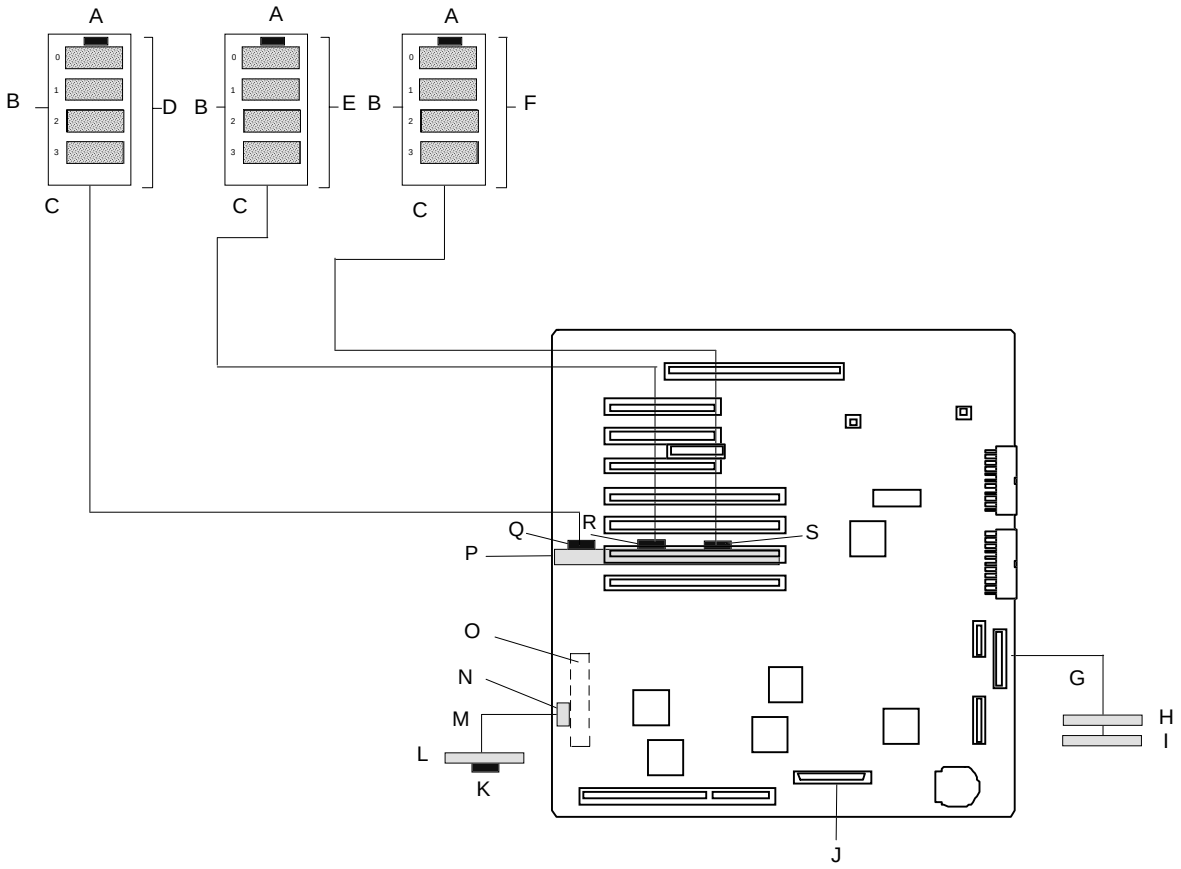
RAID and SCSI Bus Configurations

One of the standard features of your system is the three channel SecuRAID 530 (Mylex 1100) controller board, which gives your system the added security of fault tolerance. Your system has RAID pre-cabled at the factory. The RAID controller is installed in PCI slot #32 and is used to control the hard disk drives in the three hot-swap hard drive cages. The on-board Ultra2-wide SCSI controller is used to control up to four removable media peripherals (CD-ROM and tape drives). A 3 1/2-inch diskette drive is installed in the system and interfaces separately to the system I/O board. Figure A-1 illustrates the RAID and SCSI bus configuration. Figure A-2 illustrates the internal RAID and SCSI bus cabling.

The RAID controller has three interface cables each of which is connected to a hard drive cage. RAID channel 0 is connected to cage #3, channel 1 is connected to cage #2, and channel 2 is connected to cage #1.

The Ultra2-wide SCSI interface cable is connected to the SCSI connector located just below the power connectors on the right side of the system I/O board. This cable connects to the rear of the CD-ROM drive and other SCSI removable media peripherals (if present). The last drive on the daisy chain cable must have its internal SCSI terminator installed.

The on-board SCSI controller also includes a connector located at the rear of the system for connecting external Ultra2-wide devices.



A. SCSI backplane terminator
B. Distribution backplane
C. Wide SCSI interface cable
D. Ultra2 wide SCSI-3 disks in lower cage
E. Ultra2 wide SCSI-3 disks in middle cage
F. Ultra2 wide SCSI-3 disks in upper cage
G. Diskette interface cable
H. 2nd 3 1/2-inch device (optional)
I. 3 1/2-inch diskette drive
J. Wide SCSI-2 connector
K. SCSI terminator
L. External wide SCSI device
M. External wide SCSI cable
N. Wide SCSI connector
O. I/O riser board (connector located on back of system I/O board)
P. RAID controller in PCI slot #32
Q. Channel 0 cable connector
R. Channel 1 cable connector
S. Channel 2 cable connector

Figure A-1. RAID and SCSI Bus Cable Configuration

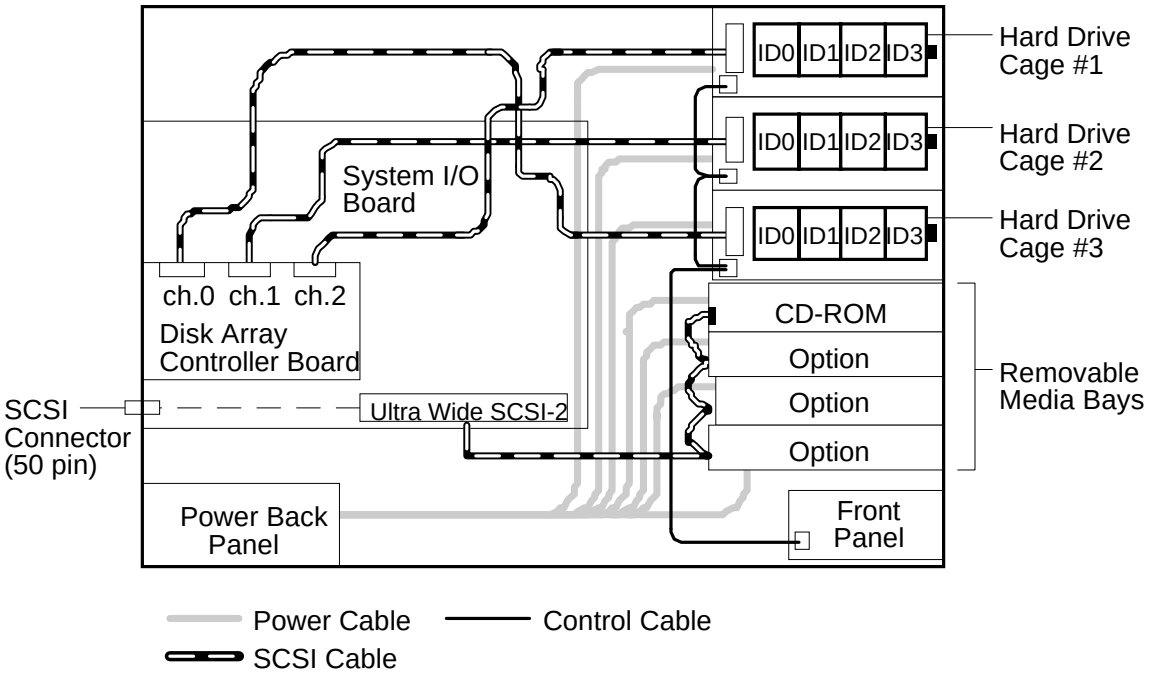


Figure A-2. RAID and SCSI Bus Cabling

B

Memory Configurations

- Memory DIMM Configurations

Memory DIMM Configurations

Your system can contain up to two memory boards (one standard and one optional memory board) with each board containing sixteen 168-pin DIMM sockets for a total of up to 8 GB of system memory, using 256MB DIMMs. See Figure B-1. DIMM sockets on the board are organized as four 144-bit wide (122-bit wide data path with 16 parity bits) banks. Parity generation/checking is provided for each byte. DIMM sockets accept 168-pin single- or double-sided DIMMs. A bank must be populated using identical DIMMs. DIMMs may vary in size from one bank to the other, but all DIMMs must be the same speed. Timing requires 50 ns fast page devices.

A memory DIMM upgrade kit consists of four identical (of the same size and type) DIMMs defined as:

4 x 64MB DIMMs = 256MB

4 x 128MB DIMMs = 512MB

4 x 256MB DIMMs = 1GB.

The first bank of DIMMs should be installed in sockets P02, P03, P04 and P05. When you install additional DIMMs, you must start with bank B and continue to bank D. When you remove DIMMs, you must start with the highest populated bank of DIMMs. Table B-1 lists the distribution of DIMMs for system memory configurations that maximize socket availability, other combinations are possible.

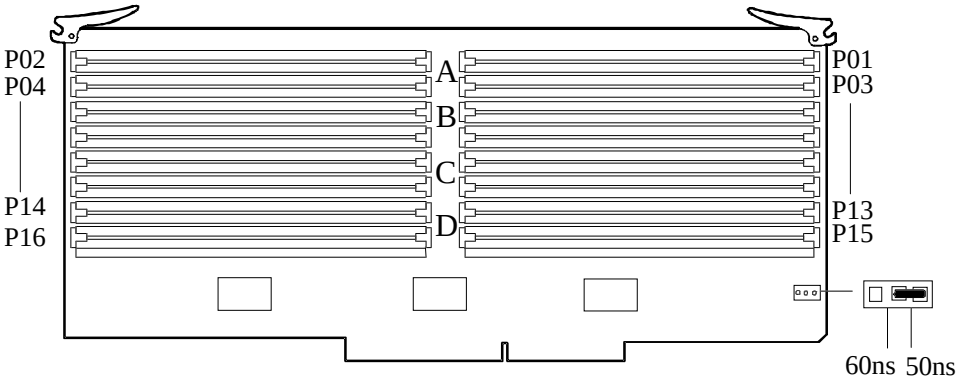


Figure B-1. Memory Board DIMM Sockets

Table B-1. Memory Configurations

Total Memory	Bank #A	Bank #B	Bank #C	Bank #D
256MB	4 x 64MB			
512MB	4 x 128MB			
768MB	4 x 128MB	4 x 64MB		
1024MB	4 x 256MB			
1280MB	4 x 256MB	4 x 64MB		
1536MB	4 x 256MB	4 x 128MB		
1792MB	4 x 256MB	4 x 128MB	4 x 64MB	
2048MB	4 x 256MB	4 x 256MB		
2304MB	4 x 256MB	4 x 256MB	4 x 64MB	
2560MB	4 x 256MB	4 x 256MB	4 x 128MB	
2816MB	4 x 256MB	4 x 256MB	4 x 128MB	4 x 64MB
3200MB	4 x 256MB	4 x 256MB	4 x 256MB	
3456MB	4 x 256MB	4 x 256MB	4 x 256MB	4 x 64MB
3584MB	4 x 256MB	4 x 256MB	4 x 256MB	4 x 128MB
4096MB	4 x 256MB	4 x 256MB	4 x 256MB	4 x 256MB

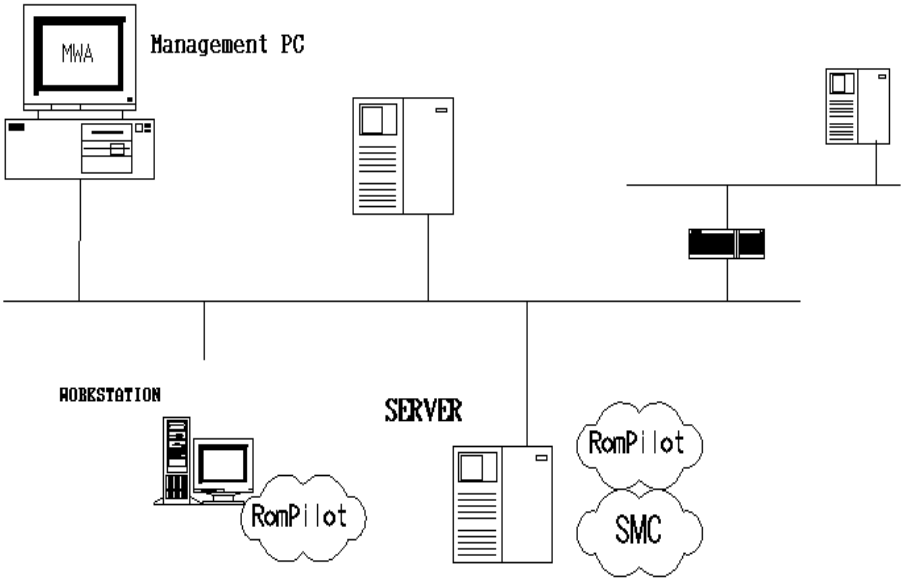
C

Management Workstation Application

- Overview
- MWA System Requirements
- Installing MWA
- MWA Main Window
- Using MWA
- Dialog Boxes
- Troubleshooting

Overview

Management Workstation Application (MWA) is an application used for remote server management in a network environment. The managed server may be remotely accessed from a management PC (the computer in which ESMPRO™ operates). MWA is a pre-boot management application in that the managed server is accessed prior to loading the server operating system.



The following server operations are available from a management PC running MWA software:

- **Remote console control -** This function enables you to see the screen of a server from the console of the management PC and to key in data to the server from the keyboard of the management PC
- **Remote drive access -** This function enables a server to access a floppy disk drive on the management PC. A server can also be booted from the floppy disk on the management PC.
- **SOS recovery** - If an SOS message is received from a server, MWA receives the fault information and sends the necessary instructions to the server for recovery.
- **Alert to ESMPRO™** - If MWA receives an alert message from a server, it sends this message to ESMPRO™ AlertManager.
- **Power cycling** - This function enables powering the server OFF and ON.
- **Reset control** - This function enables reset of the server.
- **Event Log retrieval** - All event log data recorded in the server is retrieved by the management PC.

Remote Console

Remote console enables the user to view the screen of a server or key in data to the server from the keyboard of the management PC as if operating the keyboard of the server. When a server is connected to MWA, the remote console function allows the server screen to display in the server window.

Remote Drive

Remote drive allows a server to access the diskette drive on the management PC or an FD image file as if it were the drive on the server.

> ***Note:*** An FD image file is copied and saved from a floppy disk. This file can be used instead of a floppy disk as a remote drive for a server.

A server can also be booted from a floppy disk on the management PC. When the remote drive function is in use, [RD] is displayed at the title bar of the server window. In this case diskette drive A on a server is allocated as a remote drive. Therefore, the floppy disk drive of the server itself cannot be used while the remote drive function is in use.

MWA System Requirements

This section outlines the management PC requirements necessary for using MWA.

Operating Systems:

- Windows 95 / Windows 98 / Windows NT 4.0 or later
- More than 3MB of free RAM
- More than 5MB of disk space
- ESMPRO Version 3.22 or later.
- TCP/IP Network.

Managed Server:

- Servers managed by MWA must support the RomPilot extended BIOS.

Installing MWA

To use MWA several procedures must be performed to configure the managed server and the management PC. For ease of installation these procedures should be performed in the order presented in the following sections. Installation procedures include procedures to be performed at the server and at the management PC.

Server Procedures

- Create a server system generation diskette (SG) containing essential server networking information.
- Run the BIOS Setup Utility making the changes to BIOS necessary for server acceptance of MWA support.

Management PC Procedures

- Install MWA software on the management PC.
- Configure and register SG information within MWA at the management PC.

Creating a Server System Generation Diskette (SG)

For the management PC to connect with a server, server system generation (SG) information must be configured and registered on MWA software running on the management PC.

In this procedure you will create a diskette containing your server's SG information. In the following section, you will register the SG information with MWA.

1. Prepare a floppy disk, formatted with MS-DOS.
2. Insert the EXPRESSBUILDER CD in the server's CD-ROM drive, and boot the server from the CD. The EXPRESSBUILDER menu displays.
3. Select: **Custom Setup**.
4. Select: **System Management**.
5. Select: **Network Setup**. The Network setup program starts.
6. Insert the floppy disk prepared in step 1 into the server's diskette drive and press the **ESC** key.

7. Set the SG information as follows. (The items with * marks must be entered.)

   — Computer Name*
   Enter the server name.

   — IP Address*
   Enter the IP address of the server.

   — Subnet Mask*
   Enter the subnet mask of the server.

   — Default Gateway*
   Enter the IP address of the default gateway on the network.

   — Management PC (1)(3)'s IP*
   Enter the IP address of the management PC with MWA installed. (1)(3) shows priority.

   — Pass-phrase*
   Enter the pass-phrase that is used for communication between server - RomPilot and management PC - MWA.

   — Community Name (SMC supported servers)
   Enter a key for authentication used between server SMC and management PC - MWA (community name for SNMP trap). Default value is public.

   — Magic Number (SMC supported servers)
   Enter code key that is used between server - SMC and management PC - MWA.

   — Recovery Mode (SMC supported servers)
   Select automatic or manual.
   If automatic is selected, SMC automatically executes recovery processing when a fault occurs. It will be accepted as an instruction from MWA.

   — SOS Alert (SMC supported servers)
   Select SOS Alert enabled or disabled.
   If disabled is selected, SMC will not send an SOS message to MWA when a fault occurs.

8. Select: **Save Setting**. SG information is saved on the floppy disk. You will need this floppy disk (called the SG information FD) to register the server on the management PC MWA.

> ***Note:*** For details on Network setup, see EXPRESSBUILDER online help.

Configuring Server BIOS Setup

To use MWA, you must configure the server's BIOS with three specific settings enabled. These settings take place in Advanced Menu and the Hardware Menu of the BIOS Setup. (Refer to Chapter 3, “Configuring Your System,” for BIOS Setup information.) The following table shows the settings that must be enabled to use MWA.

Menu Parameter Name	Required Setting for MWA
ADVANCED MENU	
Advanced Press **Enter** for menu.	
ROMPilot Support	Enabled
Peripheral Configuration Press **Enter** for menu.	
LAN controller	Enabled
SYSTEM HARDWARE MENU	
Wake On LAN	Enabled

Installing MWA on the Management PC

To Install MWA on the management PC perform the following procedure.

1. Start Windows95 / Windows 98 / or Windows NT on the management PC.
2. Insert the EXPRESSBUILDER CD into the PC CD-ROM drive.
3. Using Explorer, execute "setup.exe" in MWA folder of the CD-ROM. MWA installer will start.
4. Follow MWA installer instructions.

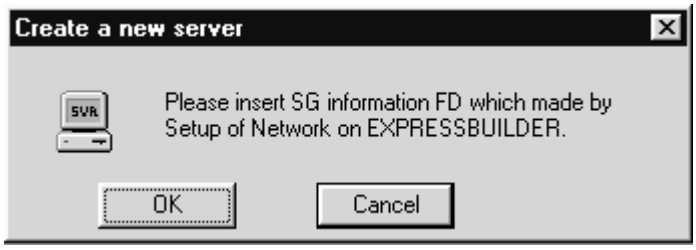
> ***Note:*** MWA will be registered in the Startup folder after installation, and started automatically when an OS start (Log in) is initiated.

Registering SG Information on MWA

In order for MWA to connect with a server, the server system generation information (SG) must be set and registered on MWA.

In this procedure SG information is registered on MWA from the server System Generation diskette (SG) created in the section *Creating a Server System Generation diskette (SG).*

1. Run MWA on the management PC and select the New SG command from File menu. The *Create a New Server* dialog box displays.



2. Insert the SG Information floppy disk into the management PC diskette drive.
3. Select OK. Server SG information is registered on MWA.

MWA Main Window

The MWA main window provides a graphical user interface (GUI) to access server control operations and to launch the management plug-ins. At the top of the GUI is the menu and tool bar. These provide the options to initiate plug-ins and other support features. A status bar at the bottom displays connection information like server name, line status, and mode.

Toolbar

The tool bar buttons of MWA main window combine server control and management plug-in options available from the Connect and Action menus as follows.

Open - The Open command opens a server window for a specified server.

Connect - The Connect command connects a current server.

Disconnect - The Disconnect command disconnects a current server.

Pause POST - The "Pause POST" command will pause to the server in the middle of POST if selected when the current server is executing POST.

To resume POST, select the Go to End of POST command, the Go (MWA mode) command, or the Go (No MWA mode) command.

Go to End of POST - The "Go to End of POST" command will pause the server at the end of POST if selected when the current server is executing POST.

To resume booting, select MWA mode command or the No MWA mode command.

MWA mode - When MWA mode command is selected when POST is paused, the server resumes POST and executes booting in MWA mode.

No MWA mode - If the No MWA mode command is selected when POST is paused, the server resumes POST and executes booting in No MWA mode.

Main Menu

MWA Main menu has the following menus.

- **File**

  — **New SG…**registers server system generation (SG) information. This command requires the SG information floppy disk described in *Registering SG Information on MWA*. When this command is selected, the Create a new server dialog box displays. Insert the floppy disk and click the OK button. If the IP address in a new server SG information exists in an old server SG information, the old information is updated. Once the registration has been completed, the server SG information is saved as (IP address).rp file. MWA can be connected only to servers registered using the New SG command.

  — **Open…**opens a server window for a specified server. The Open a Server dialog box lists SG-registered servers on MWA. Select a server to operate.

  — **Close…**closes the active server window and disconnects the server.

  — **Delete…**deletes the SG information for the selected server.

  — **Write back SG…**saves server SG information on a floppy disk. The SG information can be set again using the floppy disk. When this command is selected, the Write back a server dialog box displays. Insert a formatted floppy disk and select the OK button. Then, select a server from the server list. SG information for only one server can be saved on a floppy disk because the server SG information for all files are saved under the same name.

  — **Properties…**displays or set properties for the current server. If no servers are in operation, the Select a Server dialog box opens. Select a server to change its properties. In the Server Properties dialog box, view or set necessary information.

  — **Defaults…**allows you to view and set basic properties for all servers in the Default Server Properties dialog box. If [Use Default Settings] is checked in the Server Properties dialog box, server properties are set to the values specified in the Default Server Properties dialog box.

  — **Configure…**changes MWA configuration in the Configure dialog box. Timer counts for no response detected. After connecting to a server, MWA sometimes cannot receive any response from the server because the server is busy. If the server responds within specified timer count, MWA does not close communication. Increase the timer count if you expect the server to be busy for a long time. The default is 300 seconds.

— **Server Monitor…**enables or disables the monitor for servers. The server monitor continually monitors server status using PING or RPC even when MWA is not connected to the servers. The status of the current server is displayed in the status bar. When the server monitor is enabled, a check mark appears next to the menu item.

— **Exit…**terminates MWA and closes the connections to all servers.

- **View**

— **Toolbar…**displays or hides the toolbar. The toolbar includes buttons for some of the most common commands in MWA, such as the Open command. When the toolbar is displayed, a check mark appears next to the menu item.

— **Status Bar…**displays or hides the status bar. The status bar describes the action to be executed by the selected menu item or depressed toolbar button, and information on the current server. When the status bar is displayed, a check mark appears next to the menu item.

— **Summary…**opens or closes the Server Summary dialog box. The Server Summary dialog box displays the IP addresses, server names, and current statuses of all the SG-registered servers on MWA. When the Server Summary dialog box is open, a check mark appears next to the menu item.

— **History Log…**opens or closes the History Log dialog box. The History Log dialog box displays server communications, operator commands, and other events in chronological order. When the Delete button is selected, the Delete Logged Messages dialog box displays. The operator can delete all or part of the log. When the History Log dialog box is open, a check mark appears next to the menu item.

- **Reset/Reboot**

— **Cold Reset…**executes a cold reset on a current server.

— **Warm Reset…**command executes a warm reset on a current server. Some types of servers have been set such that a cold reset is executed by the Warm Reset command. For details, refer to the users guide for the managed machine.

— **Wake-up…**activates a server whose power is off. The Wake-Up command is executed normally under the following conditions. MWA knows the server MAC address as the server has been connected with MWA more than once. OS was terminated normally the last time server was active.

— **Pause at Next Connect…**specifies whether to pause POST when a current server is connected the next time. When pause is set, a check mark appears next to the menu item. Note that this setting is valid only when the server is connected the next time and not for later connections.

- **Data**

— **CMOS…**displays the CMOS data of a current server in the Data dialog box. The data can be read only when the server is paused at the end of POST.

— **ESCD…**displays the ESCD data of a current server in the Data dialog box.

— **DMI…**displays the DMI data of a current server in the Data dialog box. The data can be read only when the server is paused at the end of POST.

— **PCI…**When the Read button is selected in the PCI Information dialog box, the PCI information of a current server is displayed. The information includes a bus number, a device number and a function number of each device name and so on.

- **Window**

— **Cascade…**command arranges the opened windows in an overlapping fashion.

— **Tile…**arranges the opened windows in an non-overlapping fashion.

— **Arrange Icons…**arranges icons for minimized windows at the bottom of the main window. If there is an open window at the bottom of the main window, then some or all of the icons may not be visible because they will be underneath this window.

— **Server Window Names 1,2…**MWA displays a list of currently opened server windows at the bottom of the Window menu. A check mark appears in front of the current server window name. Select a server window to activate.

Pop-Up Menus

Clicking the right mouse button in a server window displays a Pop-up menu. From this menu, you can execute main commands on the current server.

— **Connect command…**connects the current server to the management PC. Once the server has been connected, [Connected] is displayed in the title bar and the server screen displays in the server window.

— **Disconnect command…**closes the connection to a current server. Once the server has been disconnected, [Not Connected] is displayed in the title bar.

— **Change Remote Drive command…**temporarily changes the remote drive of a current server. This command can be executed only when a remote drive is in use. Set the necessary information in the Temporary Change to Remote Drive dialog box. This command does not update the server properties. The setting becomes invalid when the server is disconnected.

— **Pause POST command…**pauses the server in the middle of POST when the current server is executing POST. To resume POST, select the Go to End of POST command, then select Go (MWA mode) command, or the Go (No MWA mode) command.

— **Go to End of POST command…**pauses the server at the end of POST when the current server is executing POST. To resume booting, select the Go (MWA mode) command or the Go (No MWA mode) command.

— **Go (MWA mode) command…**When the Go (MWA mode) command is selected when POST is paused, the server resumes POST and executes booting in MWA mode.

— **Go (No MWA mode) command…**If the Go (No MWA mode) command is selected when POST is paused, the server resumes POST and executes booting in No MWA mode.

— **Restore Final Screen command…**displays the remote console screen as it appeared immediately before the server was disconnected. This command becomes valid after the server is disconnected.

— **Clear Screen command…**clears the remote console display. This command becomes valid after the server is disconnected.

— **Server Summary Pop-up menu…**Position the cursor on a server record in the Server Summary dialog box and click the right button to display the Server Summary Pop-up menu. From this menu, can execute main commands on the server.

Using MWA

Opening a Server Window

To remotely access a managed server from the management PC using MWA, you must open a server management window for the server. You can then issue commands to the server and make various settings though this window.

There are two ways to open a server window:

- **Using a command** - Select **Open** from the File menu. The **Select a Server** dialog box displays. Select the server you want to remotely access.
- **Automatic connection** - If a server is set for automatic connection, MWA opens a server window and connects to the server when a notification is received from the server. Refer to *Connection and Disconnection* in the next section.

Connecting and Disconnecting the Server

MWA is a pre-boot management application. MWA can be connected to a server only from the time the server is powered on or reset until the operating system is booted in the server. Once a server is connected, the remote control function displays the server screen in the server window at the management PC. Most MWA functions can be executed only when a server is connected.

Connect to a server as follows:

- **Connect command** - Select Connect from the Pop-up menu in the server window.
- **Setting automatic connection** - Select Properties from the Pop-up menu in the server window. The Server Properties dialog box displays. Check [Activate] for RESET or POST Error alert on the Alert page. After this setting is made, MWA will automatically connect to the server each time a specified alert is reported from the server.

Disconnect a server from the management PC using one of the following commands:

- **Disconnect command** - Select Disconnect from the Pop-up menu in the server window.
- **Close command** - Close from the File menu closes the active server window and closes the connection to the server.
- **Exit command** - Exit from the File menu terminates MWA and closes the connections to all servers.
- **Server reset or reboot** - When a server is reset, its connection to MWA is closed. If automatic connection is set for the server, the server is connected again.

Using a Remote Drive

When a remote drive is in use, [RD] displays in the title bar of the server window. To connect to a remote drive, perform the following steps:

1. Select Properties from the Pop-up menu in the server window to open the Server Properties dialog box. Select the Remote Drive page.
2. At the Remote Drive page, select the remote drive to use. Select [Floppy A:] or [FD Image File]. If [FD Image File] is selected, enter the file name of the FD image. The FD image file should be created in advance.

> ***Note:*** If [Read Only] is checked, an FD image file can be used in some servers.

To change the remote drive FD image file:

1. Select the Change Remote Drive command from the Pop-up menu in the server window. The Temporary Change to Remote Drive dialog box opens.
2. Select [Floppy A:] or [FD Image File]. If [FD Image File] is selected, enter a file name.

> ***Note:*** If [Read Only] is checked, an FD image file can be used in some servers.
>
> ***Note:*** The Server must be reset after a remote drive is used in the server.

Setting and Clearing Server Pause

MWA can pause server processing during or at the end of the server Power On Self Test (POST.)

Set a server pause as follows:

- **Pause command -** During server POST, select Pause POST from the Pop-up menu in the server window. The server pauses immediately. When the Go to End of POST command is executed, the server pauses again after completing the POST.
- **Pause at Next Connect command** - To set pause at the next server connection, select the Pause at Next Connect command from the Pop-up menu in the server window. When pause is set, a check mark appears next to the menu item.
- **Pause at POST error command** - Select Properties from the Pop-up menu in the server window to open the Server Properties dialog box. Check [Activate] for POST error alert on the Alert page. When MWA receives this alert message from the server, MWA will connect to the server and the server POST will be paused

Clear a server pause to resume processing as follows:

- **Go command** - To resume server processing, select the Go (MWA mode) command or the Go (No MWA mode) command from the Pop-up menu in the server window.

A server pause is also cleared in the following ways:

- Time-out reset
- If there is no communication between MWA and a disconnected server for five minutes or longer, the server is automatically reset.

Recovering from an SOS

If a fault is detected, a server that includes a system management controller (SMC), SMC transmits an SOS message to the management PC. When this SOS message is received, MWA opens an SOS Receive dialog box to display the SMC event log and other information.

The server recovery method depends on the recovery mode of each server.

- **Automatic recovery mode** - If an SOS message is received from a server, MWA displays the server information in an SOS Receive dialog box but does not accept a server recovery instruction from the operator. The server automatically executes recovery processing, such as reset.
- **Manual recovery mode** - If an SOS message is received from a server, MWA displays the server information in an SOS Receive dialog box and waits for a server recovery instruction from the user. Make an appropriate instruction in the dialog box.

Note: If SOS Alert is disabled in [Setup of Network] in the server, the server does not send SOS message to MWA.

Alerting ESMPRO™

If MWA receives an alert message from a server, it sends this message to ESMPRO™ AlertManager. Alert types from MWA to ESMPRO are as follows.

- Alerts from the server RomPilot
  - — System Reset
  - — *POST stalled (Reset by POST stalled)
  - — *SMI stalled (Reset by SMI stalled)
  - — *Boot failed (Reset by boot failed)
  - — POST end (Booting)
  - — POST error
  - — Security breach attempted
- Alert from the server System Management Controller (SMC)
  - — Sensor limit alarm
  - — CPU missing
  - — POST stalled
  - — SMI handler alarm
  - — SMI handler stall

* Not supported by some server models.

Dialog Boxes

Select a Server Dialog Box

The Select a server dialog box displays a list of SG-registered servers on MWA.

Server Properties Dialog Box

From the Server Properties dialog box you can view and set properties for the current server. The contents of the server properties are as follows:

- **ID page…**provides server identification information, such as a server name, an IP address, a MAC address, and a UUID.
- **Alert page…**Sets MWA operation for each type of alert which comes from a server.
- **[Sound] is checked…**MWA beeps when an alert is received from a server. The server window of the server becomes active.

- **[Activate] is checked…**When an alert is received from a server, the window of the server becomes active. If [Activate] is checked for RESET or POST Error alert, MWA attempts to connect to the server. If [Use Default Settings] is checked, this property is set to the values set by the Defaults command.
- **Remote Drive page…**A remote drive can be set for a server.
- **[None] is check…**A remote drive is disabled. Server's local drive can be used.
- **[Floppy A:] is checked…**A floppy disk drive on the management PC becomes a remote drive for the server.
- **[FD Image File:] is checked…**A specified FD image file in the management PC becomes a remote drive for the server. If an image file is set as a remote drive, click the Create/Copy Image File button to display the Create/Copy Image File dialog box. From there you can create an image file or copy one to a floppy disk. If [Read Only] is checked, one FD image file can be used by more than one server. If [Use Default Settings] is checked, this property is set to the value set by the Defaults command.

Default Server Properties Dialog Box

From the Default Server Properties dialog box you can view and set basic properties of all servers. If [Use Default Settings] in the Server Properties dialog box is checked, the server property is set to the values set by the Defaults command.

- **Alert page…**Set MWA operation for each type of alert from a server.
- **[Sound] check…**MWA beeps when an alert is received from a server. The server window of the server becomes active.
- **[Activate] check…**When an alert is received from a server, the window of the server becomes active. If [Activate] is checked for RESET or POST Error alert, MWA attempts to connect to the server.
- **Remote Drive page…**A remote drive can be set for servers.
- **[None] check…**A remote drive is disabled. Server's local drive can be used.
- **[Floppy A:] check…**A floppy disk drive on the management PC becomes a remote drive for the server.
- **[FD Image File:] check…**A specified FD image file in the management PC becomes a remote drive for the server. If a FD image file is set as a remote drive, click the Create/Copy FD Image File button to display the Create/Copy FD Image File dialog box where you can create an FD image file or copy one to a floppy disk. If [Read Only] is checked, one FD image file can be used on multi servers.

Create/Copy FD Image File Dialog Box

The Create/Copy FD Image File dialog box is used to create a FD image file as a remote drive or to copy the contents of a FD image file onto a floppy disk. Select an operation to execute.

Server Summary Dialog Box

The Server Summary dialog box lists IP addresses, server names, and current status of all the SG-registered servers on MWA. This dialog box also allows the following operations:

- **Activating a server window…**Double-click on a server record to open and activate the server window for the server.
- **Executing a command on the server…**Click the right-mouse button on a server record to display the Server Summary Pop-up menu. From this menu, you can execute main commands, such as Open, Connect, and Properties on the server.

Delete Logged Messages Dialog Box

The Delete Logged Messages Dialog Box sets conditions for deleting logged messages from the history log.

- **Delete history timed at xx/xx/xx xx:xx:xx and earlier…**If a logged message is selected in the History Log dialog box, a condition for deletion can be set for messages of the same date and time and earlier. The condition becomes invalid after deletion.

  If [Server xxx:xxx:xxx:xxx only] is checked, only the messages of the specified server are deleted.

  If [General (Non-server) messages only] is checked, the messages not dependent on the server, such as Started MWA, are deleted.

  If [All messages] is checked, all the messages at the specified date and time and earlier are deleted.

- **Automatically Delete messages…**These conditions of deletion are stored and remain valid.

  If [Keep only messages less than xx days old] is checked, messages within the specified number of days from the current day are kept and other messages are deleted automatically.

  If [Keep only the xx most recent messages] is checked, the specified number of recent messages are kept and other messages are deleted automatically.

  This Automatic Deleting process is executed when the OK button is selected in the dialog box, MWA is started, and MWA is exited.

Data Dialog Box

The Data dialog box displays the CMOS, ESCD, or DMI data of a server. This dialog box also allows the following operations.

- Compare Current Data… - The previously acquired data of the current server is compared with the present data of the server, the previously acquired data of another server, or file data.

  To compare with the data of another server, select a server in the Select a server dialog box. If an error is detected by this comparison, the Data Differences dialog box displays the compared data.

- Read Data from Server… - The present data of the current server is acquired and displayed. The Save As button is used to save the acquired data in a file.

Temporary Change to Remote Drive Dialog Box

The Temporary Change to Remote Drive dialog box changes a remote drive for a server temporarily.

If [Floppy A:] is checked, a floppy disk drive on MWA-active management PC becomes a remote drive for the server.

If [FD Image File:] is checked, a specified FD image file in the management PC becomes a remote drive for the server.

If [Read Only] is checked, one FD image file can be used by more than one server. Since no FD image file can be created or copied in this dialog box, create a file using the Defaults command or the Properties command in advance.

SOS Receive Dialog Box

If a fault is detected, a server that includes the system management controller (SMC) transmits an SOS message to the management PC. When this SOS message is received, MWA opens the SOS Receive dialog box to display the server information. If the server is in Manual Recovery Mode, MWA requests the operator for the server recovery method. When MWA communicates an inquiry to the server, [Connecting] is displayed in the title bar. You can do nothing in the dialog box while the message is displayed. Wait until the message is cleared.

It is only when the OS cannot run normally due to a fault in the server that you can control the server from this dialog box. If the server is already recovered, the server cannot be operated from MWA.

Contents and functions of the dialog box are as follows:

- **Server…**The dialog box displays the name and the IP address of the server that issued the SOS message, as well as the firmware version of the SMC on the server and the recovery mode of the server. If the recovery mode is Automatic, the server is automatically reset for recovery after this dialog box displays. The server cannot be controlled from MWA.

- **Message…**The dialog box displays the SOS message received from a server on the first line. The display box also displays the SMC event log of the server sequentially from the latest data up to when the SOS occurred.

- **Server last status…**The dialog box displays the LCD contents immediately before the SOS message transmission, the POST code of the last boot processing, and the current power status (DC).

- **Server control…**The operator can send recovery instructions to a server. The buttons are explained below. If a button operation causes an error, take the appropriate action on the server that sent the SOS message.

  — Power cycle…Use this button to turn the server off and on again. The dialog box closes after the normal execution of server control is confirmed.

  — Reset…Use this button to reset a server. The dialog box closes after the normal execution of server control is confirmed.

  — Power on… Use this button to turn a server on. The dialog box closes after the normal execution of server control is confirmed.

  — Power off… Use this button to turn a server off.

  — SMI dump… The dump switch of a server is turned on. This function is valid only for a server whose power is on. Some types of servers may not support this function. If this function is not supported, the operation ends in an error.

— Get log all… All the SMC event log data recorded in a server is acquired sequentially from the oldest one and displayed by activating the Windows standard editor WordPad. Since it takes time to make an inquiry to the server, [Connecting] is displayed in the title bar. The operator can do nothing in the dialog box while the message is displayed.

Troubleshooting

This section briefly explains problems and mistakes that may occur during MWA operations.

Problem: The Select a server dialog box does not display server information.

Probable Cause: Server SG information is not registered or the information has been lost. Register the server SG information again.

Problem: MWA cannot be operated after the reset command was executed.

Probable Cause: When some reset commands are issued, MWA waits for a response and cannot perform other operations. Wait for a while.

Problem: The Read button cannot be selected in the Data dialog box.

Probable Cause: Data read from a server is restricted as follows:

The server is connected.

CMOS data and DMI data can be read at the end of POST. Stop server processing at the end of POST by selecting the Pause POST command and the Go to End of POST command from the Pop-up menu in the server window.

Problem: A remote drive cannot be used.

Probable Cause: See *Using a Remote Drive*.

Problem: Booting from a remote drive failed.

Probable Cause: Check the following:

The remote drive is set correctly.

The remote drive is a floppy disk (or a FD image file) from which MS-DOS can be booted.

The priority of the boot device of the server is a floppy disk.

Problem: The server window does not display a server screen.

Probable Cause: A graphic server screen may not be displayed correctly in the server window. The window display becomes normal when the server returns to an MS-DOS screen.

Problem: Characters are corrupted when the server window displays a server screen.

Probable Cause: If MS-DOS is booted in a language other than English, MWA cannot display the messages for this language in the server correctly. Boot MS-DOS in English mode.

Probable Cause: If the server is displaying a graphic screen, MWA may not be able to display the screen correctly.

Problem: When an MS-DOS program is activated in English mode, the server displays corrupted characters.

Probable Cause: If MS-DOS in the server is in English mode, MWA remote console correctly displays messages from the MS-DOS programs in the server. However, the server cannot display messages for other language correctly.

Problem: OS cannot be booted from the server disk.

Probable Cause: When the remote drive is set on MWA, the server is booted from the remote drive. Cancel the remote drive setting and reset the server.

Problem: The floppy disk drive on the server cannot be used.

Probable Cause: When the remote drive is set on MWA, drive A: on the server is assigned remote drive on the management PC. Cancel the remote drive setting and reset the server.

Problem: MWA cannot connect to the server.

Probable Cause: Check each item in Step 7 of *Creating a Server System Generation Diskette*.

Glossary

A

AC
(Alternating Current) The type of current available in wall outlets. All computers must convert alternating current to direct current to operate. See also DC.

Address
A label, name, or number that identifies a location in computer memory.

ASCII
(American Standard Code for Information Interchange) A standard number assigned to each of the alphanumeric characters and keyboard control code keys to enable the transfer of information between different types of computers and peripherals.

B

backplane slot
A connector on the backplane board in desktop computers and expansion boxes that allows you to install circuit cards.

backup
A copy of data for safe-keeping. The data is copied from computer memory or disk to a floppy disk, magnetic tape, or other media.

backup battery
The battery in your computer that maintains the real-time clock and the configuration information when the computer's power is removed.

base memory
An area of memory between 0 and 640 kilobytes.

baud rate
The speed with which data is transmitted during serial communication. The computer's operating system and software program must be configured for the same baud rate as the communication device, such as a serial printer. See also bps.

BIOS
(Basic Input/Output System) A program stored in flash EPROM or ROM that controls the keyboard, disk drives, video monitor, and other devices. See also flash EPROM, EPROM, and ROM.

bit
Derived from BInary digiT, a bit is the smallest unit of information a computer handles. See also byte.

boot
The process of loading the operating system into memory.

bps
(bits per second) The number of bits transferred in one second during serial communication, such as modem transmission.

byte
A group of eight bits.

C

cache memory
A very fast, limited portion of RAM set aside for temporary storage of data for direct access by the microprocessor.

CD-ROM drive
(Compact Disk ROM drive) A type of mass storage device that reads information from a compact disk.

Centronics port
An industry standard parallel port. See also parallel port.

CGA
(Color Graphics Adapter) A type of video display system that provides low-resolution text and graphics on TTL monochrome and color monitors.

CMOS
(Complimentary Metal-Oxide Semiconductor) A type of low-power integrated circuit used in computers. See also TTL.

COM1 or COM2
The name you can assign a serial port to set or change its address. See also serial port.

command
An instruction that directs the computer to perform a particular operation.

configuration
The way in which a computer is set up to operate. Some configurable options include CPU speed, serial port designation, and memory allocation.

coprocessor
See math coprocessor.

CPU
(Central Processing Unit) See microprocessor.

CRT
(Cathode-Ray Tube) The type of video display used in monitors for desktop computers.

D

DC
(Direct Current) The type of current available in the rechargeable battery packs used in portable computers. See also AC.

default
The factory setting your computer uses unless you instruct it otherwise. For example, when powering up, the computer will boot from the default drive.

density
The capacity of information (bytes) that can be packed onto a storage device, such as a floppy disk.

device driver
A software program that a computer must use to recognize and operate certain hardware, such as a mouse or a video monitor.

disk drive
A device that stores data on a hard or floppy disk. A floppy disk drive requires a floppy disk to be inserted; a hard disk drive has a permanently encased hard disk.

DOS
(Disk Operating System) See operating system.

DRAM
(Dynamic RAM) See RAM.

E

ECC
(Error Checking and Correction) A method of detecting and correcting errors.

EEPROM
(Electrically Erasable Programmable Read-Only Memory) A type of memory device that stores password and configuration information.

EGA
(Enhanced Graphics Adapter) A type of video display system that provides medium-resolution text and graphics on TTL monochrome, color, and enhanced color monitors.

EMS
(Expanded Memory Specification) A method of accessing memory beyond the 640K limit of DOS by exchanging data in and out of main memory at high speeds. Some software requires EMS to operate.

EPROM
(Erasable Programmable Read-Only Memory) A type of memory device that is usually used to store system BIOS code. This code can be erased with ultraviolet light, but is not lost when the computer is powered off. See also flash EPROM and ROM.

expanded memory
See EMS.

expansion slot
See backplane slot.

extended memory
The protected memory above 1M that is directly accessible by the microprocessor through certain utilities and operating systems. This memory is used in computers with 80286, 80386, and 80486 microprocessors.

F

flash EPROM
A type of memory device that is usually used to store system BIOS code. This code can be replaced with updated code from a floppy disk, but is not lost when the computer is powered off. See also EPROM and ROM.

floppy disk drive
See disk drive.

format
The process used to organize a hard or floppy disk into sectors so it can accept data. Formatting destroys all previous data on the disk.

G

(Gigabyte)
1,073,741,824 bytes. See also byte.

H

hard disk drive
See disk drive.

hardware
The physical parts of your computer, including the keyboard, monitor, disk drives, cables, and circuit cards.

I

IC
(Integrated Circuit) An electronic device that contains miniaturized circuitry.

(ISA Configuration Utility)
The program that you use to change the configuration of some ISA desktop computers. This program also contains information about the hardware in the computer.

interface
A connection between the computer and a peripheral device that enables them to exchange data. See also parallel port and serial port.

ISA
(Industry Standard Architecture) An industry standard for computers and circuit cards that transfer 16 bits of data at a time.

J

jumper
A small electrical connector used for configuration on some computer hardware.

K

(Kilobyte)
1,024 bytes. See also byte.

L

LAN
(Local Area Network) A group of computers linked together within a limited area to exchange information.

LCD
(Liquid Crystal Display) The type of video display used in portable computers.

LED
(Light-Emitting Diode) A small electronic device that glows when current flows through it.

LPT1 or LPT2
The name you can assign a parallel port to specify its address. See also parallel port.

LVD
Super-fast Ultra2 SCSI Low Voltage Differential (LVD) Parallel SCSI Interface. A new SCSI interface that provides greater I/O bandwidth, device connectivity, data reliability, and longer cable lengths for Ultra2 SCSI hard disk drives.

M

(Megabyte)
1,048,576 bytes. See also byte.

math coprocessor
An IC that works with the microprocessor to speed up mathematical calculations.

memory
The circuitry in your computer that stores data and programs. See also EMS, extended memory, RAM, and ROM.

microprocessor
The integrated circuit that processes data and controls the basic functions of the computer.

modem
A device used to exchange information with other computers over telephone or data lines.

module
A circuit board that plugs into a dedicated connector on the system board in your computer.

mouse
A small input device that you guide on a flat surface to control the cursor movement and operation of the computer when using certain software programs.

N

NVRAM
(Nonvolatile RAM) A type of RAM that retains its contents even after the computer is powered off. This memory stores EISA configuration information. See also RAM and SRAM.

O

operating system
A set of programs that provides the interface between other software programs and the computer.

P

parallel port
The connector on the back of your computer that allows the transfer of data between the computer and a parallel device, such as a parallel printer.

partition
The process of dividing the storage space on a hard disk into separate areas so that the operating system treats them as separate disk drives.

password
A security feature that prevents an unauthorized user from operating your computer. See also EEPROM.

PCI
Peripheral Component Interconnect. PCI is a high-performance peripherals I/O bus supporting data transfers of up to 132MB per second.

Pentium
A type of microprocessor, with a built-in math coprocessor, cache memory, and memory and bus controllers, that processes and communicates 32 bits of data at a time. This microprocessor also contains power management capabilities.

peripheral
A device connected to and controlled by the computer, such as an external disk drive or a printer.

pixel
The smallest element that is visible on a video display. The resolution of a video display system is measured in pixels.

PnP
(Plug-n-Play) Plug-and-play is the ability to plug a device into a computer and have the computer recognize that the device is there. The user doesn't have to tell the computer.

POST
Power-On-Self-Test.

R

RAM
(Random-Access Memory) A temporary storage area for data and programs. This type of memory must be periodically refreshed to maintain valid data, and is lost when the computer is powered off. See also NVRAM and SRAM.

real-time clock
The IC in your computer that maintains the time and date.

RCU
(Resource Configuration Utility) The program that you use to change the configuration of your system. This program also contains information about the hardware in your system.

ROM
(Read-Only Memory) A type of memory device that usually is used to store system BIOS code. This code cannot be altered and is not lost when the computer is powered off. See also BIOS, EPROM, and flash EPROM.

RS-232C port
An industry standard serial port. See also serial port.

S

save
To store information on a floppy disk, hard disk, magnetic tape, or some other permanent storage device.

SCSI
(Small Computer System Interface) An industry standard interface that provides high-speed access to tape drives, hard disk drives, and other peripheral devices.

SEL
(System Event Log) A record of system management events. The information stored includes the name of the event, the date and time the event occurred and data pertinent to the event. Event data may include POST error codes that reflect hardware errors or software conflicts within the system.

serial communication
Information sent sequentially, one bit at a time.

serial port
The connector on the back of your computer that allows the transfer of data between the computer and a serial device, such as a mouse, a modem, or a serial printer.

Setup program
The program that you use to change the configuration of some ISA desktop and notebook computers. This program also contains information about the hardware in the computer.

software
Programs with specific functions, such as word processing, data base management, communications, and operating system.

SRAM
(Static RAM) A temporary storage area for data and programs. This type of memory does not need to be refreshed, but it is lost when the computer is powered off. See also NVRAM and RAM.

SVGA
(Super VGA) A type of video display system that provides very high-resolution text and graphics on analog color monitors.

system board
The main circuit board in your computer. It contains most of the connectors and ports.

T

tape drive
A type of storage device using magnetic tape.

TTL
(Transistor-Transistor Logic) A type of integrated circuit used in computers. See also CMOS.

V

VGA
(Video Graphics Array) A type of video display system that provides high-resolution text and graphics on analog color monitors.

Equipment Log

Use this equipment log form to record pertinent information about your system. You will need some of this information to run the BIOS Setup Utility. Be sure to update the equipment log when you add options.

Record the model and serial numbers of the system components, dates of component removal or replacement, and the name of the vendor from whom the component was purchased. Be sure to record the same information for any components added to the system, such as hard disk drives, add-in boards, or printers.

Record the model and serial numbers of the unit and system baseboard. The model and serial numbers of the system unit are recorded on a label attached to the rear of the unit. The serial number of the system board is located along the left side of the board, near the PCI expansion slot covers.

The location of serial numbers on add-in boards, hard disk drives, and external equipment, such as video displays or printers, varies from one manufacturer to another. Literature accompanying these products should illustrate or describe the location of model and serial numbers.

Component	Manufacturer Name and Model	Serial Number (if available)	Date Installed
Server			
CPU 1			
CPU 2			
CPU 3			
CPU 4			
CPU 5			
CPU 6			
CPU 7			
CPU 8			
DIMMs			
Diskette Drive A			
Diskette Drive B			
Tape Drive 1			
Tape Drive 2			
CD-ROM Drive 1			
CD-ROM Drive 2			
Hard Disk Drive 1			
Hard Disk Drive 2			
Hard Disk Drive 3			
Hard Disk Drive 4			
Hard Disk Drive 5			
Hard Disk Drive 6			
Hard Disk Drive 7			
Hard Disk Drive 8			
Hard Disk Drive 9			
Hard Disk Drive 10			
Hard Disk Drive 11			
Hard Disk Drive 12			

Component	Manufacturer Name and Model	Serial Number (if available)	Date Installed
RAID Controller			
Network Controller 1			
Network Controller 2			
Monitor			
Keyboard			
Mouse			
External Peripherals			

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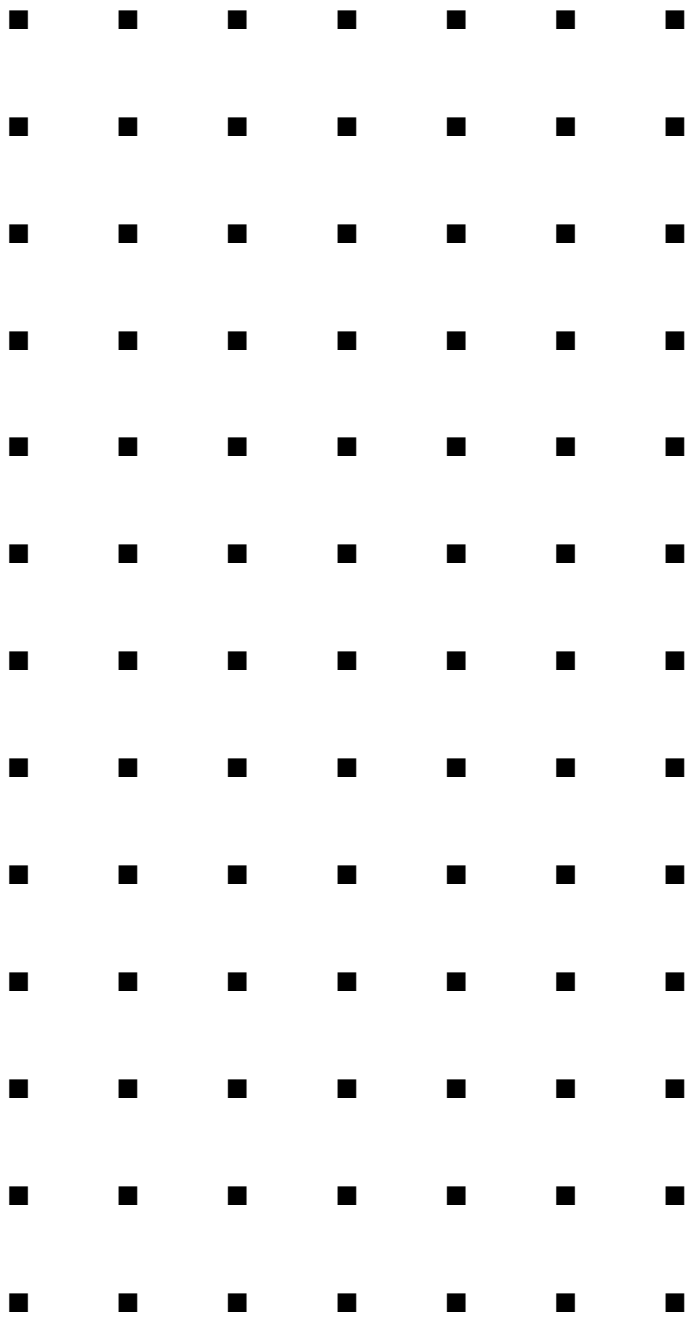

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